



UNITED STATES DEPARTMENT OF THE INTERIOR

REPORT

OF THE

*DIRECTOR OF
THE NATIONAL PARK SERVICE*

TO THE

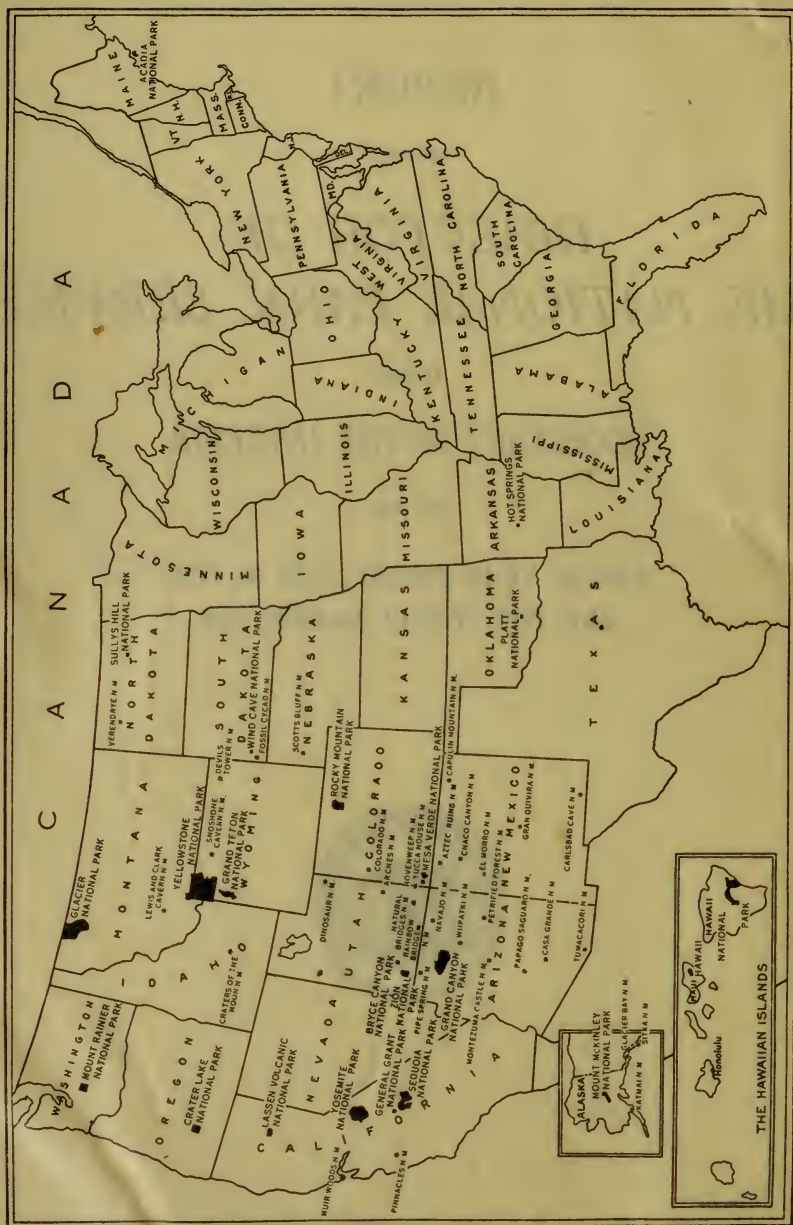
SECRETARY OF THE INTERIOR

FOR THE

*FISCAL YEAR ENDED JUNE 30, 1929-32
AND THE TRAVEL SEASON, 1929*



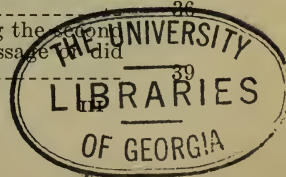
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LOCATIONS OF 21 NATIONAL PARKS AND 33 NATIONAL MONUMENTS ADMINISTERED BY THE NATIONAL PARK SERVICE

CONTENTS

	Page
roduction.....	1
year's most conspicuous events.....	1
ignation of Stephen T. Mather.....	2
ional park and monument system enlarged.....	3
Grand Teton National Park established.....	3
Yellowstone National Park.....	4
Lassen Volcanic National Park.....	4
Acadia National Park.....	4
Yosemite National Park.....	4
New Arches National Monument.....	5
posed park boundary adjustments.....	5
Yellowstone National Park.....	5
Zion National Park.....	6
Bryce Canyon National Park.....	6
tern national park projects.....	6
Progress on Smoky Mountains project.....	7
The Shenandoah project.....	8
The Mammoth Cave project.....	8
estigations of other proposed park and monument areas.....	8
Ouachita project.....	9
nsfer of military parks and monuments not authorized by Seventieth ongress.....	10
private land situation.....	10
ecational development.....	12
Report of educational committee.....	12
Educational Division in Washington organization planned.....	15
Educational plans developed.....	16
Museum development.....	16
Libraries in the national parks.....	17
Lectures in the national parks.....	17
Field trips conducted by ranger naturalists.....	18
Self-guiding and nature trails.....	18
Wild-flower gardens.....	18
Universities and colleges conduct field classes in parks.....	18
Funds donated for photographic activities.....	19
heological investigations.....	19
est protection.....	20
The fire menace.....	20
Glacier Park fire.....	21
Insect and tree-disease control work.....	22
ervation of park landscape.....	22
ert advisers continue study of Yosemite.....	23
dition of park fauna.....	24
Studies of wild-animal problems conducted.....	25
Predatory animal control.....	25
Fish-culture work.....	26
itation in the parks.....	27
ter use of the national parks.....	28
vice by the public utility operators.....	29
airplane problem.....	30
Airplanes at the Grand Canyon.....	30
venth national park conference.....	31
ropriations and revenues.....	31
k road development.....	31
vice wrongly classified.....	32
ional Capital Park and Planning Commission.....	33
rbureau and State cooperation.....	33
ky Mountain Park under Federal jurisdiction.....	34
nations.....	34
sign park developments.....	35
isolation.....	36
Bills enacted into law.....	36
Other measures introduced or partially acted upon during the session of the Seventieth Congress which failed of passage not receive the approval of the President.....	39



	Page
Legislation—Continued.	
Bills introduced in the first session of the Seventy-First Congress and still pending.....	40
Presidential proclamations.....	41
Executive orders.....	41
Individual park reports in Appendix C.....	42
Conclusion.....	42
Appendix A.—The national parks and monuments:	
The national parks administered by the National Park Service, Department of the Interior.....	44
The national military and other parks administered by the War Department.....	45
The national monuments administered by the National Park Service, Department of the Interior.....	46
The national monuments administered by the Department of Agriculture.....	48
The national monuments administered by the War Department.....	49
Appendix B.—Statistics:	
Visitors to the national parks, 1914–1929.....	50
Visitors to the national monuments, 1924–1929.....	51
Private automobiles entering the national parks during seasons 1922–1929.....	51
Automobile and motor-cycle licenses issued during seasons 1925–1929.....	52
Receipts collected from automobiles and motor-cycles during seasons 1925–1929.....	52
Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917–1929, inclusive; also appropriations for the fiscal year 1930.....	53
Summary of appropriations for administration, protection, and improvement of the national parks and national monuments, together with the revenues received, for the fiscal years 1917–1930.....	59
Statement of amounts transferred under the authority contained in the appropriation acts to transfer 10 per cent from one appropriation to another.....	59
Appendix C.—Reports of officers in charge of the national parks and monuments, and engineering, educational, and forestry divisions:	
Acadia National Park.....	60
Bryce Canyon National Park.....	62
Crater Lake National Park.....	64
General Grant National Park.....	68
Glacier National Park.....	70
Grand Canyon National Park.....	77
Grand Teton National Park.....	84
Hawaii National Park.....	86
Hot Springs National Park.....	91
Lassen Volcanic National Park.....	95
Mesa Verde National Park.....	98
Mount McKinley National Park.....	106
Mount Rainier National Park.....	107
Platt National Park.....	115
Rocky Mountain National Park.....	116
Sequoia National Park.....	122
Sullys Hill National Park.....	127
Wind Cave National Park.....	128
Yellowstone National Park.....	130
Yosemite National Park.....	144
Zion National Park.....	150
Southwestern National Monuments.....	155
Carlsbad Cave National Monument.....	158
Craters of the Moon National Monument.....	160
Muir Woods National Monument.....	160
Pinnacles National Monument.....	161
Report of civil engineering division.....	161
Report of the landscape architectural division.....	163
Report of the educational division.....	169
Report of the forestry division.....	173

ANNUAL REPORT OF THE DIRECTOR OF THE NATIONAL PARK SERVICE

DEPARTMENT OF THE INTERIOR,
NATIONAL PARK SERVICE,
Washington, D. C., October 14, 1929.

The SECRETARY OF THE INTERIOR.

SIR: In submitting to you this thirteenth annual report of the National Park Service, I wish to express, on my own behalf and that of our field officials, deep appreciation of the interest which you have taken in the national parks. Your visits to several of these reservations during the past summer, and particularly your meeting the superintendents at the opening of the Yellowstone conference, have been a source of inspiration and encouragement to us all.

As has been the practice in past years, this report of conditions in the National Park Service and progress of work in general covers the fiscal year ended June 30, 1929, although for comparative purposes in connection with travel statistics the travel year has been considered as ending September 30. Progress of road and other construction work, which is done on a seasonal rather than a fiscal year basis, is also reported for the year ended September 30.

Again all travel records have been broken, with a total amount of 3,248,264 visitors to the national parks and monuments. Of these, 2,680,597 visited the parks, an increase of 158,409 over 1928. The monument total of 567,667 visitors was 65,011 more than recorded last year. Among the visitors were the members of the subcommittee of the House Appropriations Committee, handling appropriations for the Department of Agriculture, accompanied by Forester Stuart, head of the United States Forest Service. This party visited Yellowstone, Mount Rainier, Yosemite, Zion, and Bryce Canyon National Parks. The Park Service was glad to cooperate in making arrangements inside the parks for the party. While the trip was not made in connection with park matters, we appreciated the interest which the members took in coordinating Park Service problems with those of the Forest Service. I regret that the Senate Public Lands Committee was unable to make the park trip planned, and hope that they may be able to arrange it for next summer under the leadership of Senator Nye.

THE YEAR'S MOST CONSPICUOUS EVENTS

The outstanding event of the year was the adoption by Congress of a policy directing that the private holdings in the national parks shall be acquired, and authorizing the employment of the power of condemnation, if necessary, in order to accomplish this purpose. Authorization of a fund of \$3,000,000, of which \$250,000 in cash

was actually appropriated, these funds to be matched by equal amounts of private contributions, was the financial structure set up to carry out the plan. A friend of the service immediately agreed to match as much of the funds as might be necessary to acquire the magnificent stands of sugar and yellow pine on private lands in Yosemite National Park which were in imminent danger of destruction.

The high lights of our educational activities for the year were the report of the informal educational committee, the appointment of an educational advisory board, headed by Dr. J. C. Merriam, president of the Carnegie Institution, and the continuation of trail-side and branch museum development in Yellowstone National Park, all of these achievements being made possible by grants of the Laura Spelman Rockefeller Memorial. Notable progress was also made in educational division planning, extension of lecture and guide service, compilation of scientific data, and publication of Nature Notes, our little magazine issuing from various parks in mimeograph form.

Park visitors benefited by the road improvements which it has been possible to make during the past several years under enlarged appropriations. With the passing of jurisdiction over Rocky Mountain National Park to the Federal Government, our first major road construction project has been initiated in that park through the letting of a contract for the construction of the first section of the Trail Ridge Road to cross the Continental Divide.

The establishment of the Grand Teton National Park, through congressional act approved last February, ended a 31-year effort to give this outstanding area park status. I believe this new park, which is located about 11 miles south of the Yellowstone in the heart of the picturesque "dude ranch" country, is destined to become one of the most popular of the system.

RESIGNATION OF STEPHEN T. MATHER

Early in this report I record the resignation of Stephen T. Mather, the first director and founder, in more than one sense, of the National Park Service. Coming into Government service in 1915, before there was a park bureau, Mr. Mather gave all his time and thoughts and energy to the furtherance of the park work during the next 14 years. Through his earnest efforts the National Park Service emerged from a desired ideal to an accomplished fact, and great strides forward were made along all lines of park endeavor. Especially noteworthy were the results he obtained in attracting an unusually high class of men to positions of responsibility in the Park Service and in interesting capital in the development of public utilities in the parks themselves. Mr. Mather was personally beloved by every member of his organization, and for this reason alone his resignation caused each and every one of us poignant sorrow and regret.

When he was forced to retire last January on account of ill health, brought on largely through his steadfast devotion to his work, Secretary West, in accepting his resignation, paid high tribute to him when he said:

Under your splendid leadership the people of the Nation have been awakened to the beauties and possibilities of the national parks and the necessity of conserving these areas for all time. So firmly have you built the foundations of the National Park Service that it is now bound to move firmly onward along the lines of greatest service to the people. * * * Taken all in all, you have achieved results that I believe no other man could have accomplished in the early days of organization and administration during the trying period of the World War and its aftermath.

Newspaper and magazine tributes to Mr. Mather's character and public achievements appeared in all sections of the country. A fine appreciation of his work was voiced by Congressman Louis C. Cramton, of Michigan, in an address in the House of Representatives, and this in turn was widely quoted and commended by the press. The Pugsley gold medal was awarded to Mr. Mather by the American Scenic and Historic Preservation Society this past year, and the gold medal of the National Institute of Social Sciences in 1926 for his service to the Nation in the development and administration of the national parks. He was awarded the degree of doctor of laws by George Washington University in 1921 and by the University of California in 1924 for his conspicuous service to the country in the fields of conservation and education.

Briefly summing up national park affairs under his administration, when Mr. Mather entered Government service as assistant to the Secretary in 1915 there were 14 national parks and 18 national monuments, with a combined area of 7,426 square miles, and \$253,-646.80 was appropriated to maintain them. In addition the War Department was allowed \$245,000 for road work and maintenance in several of the parks during 1915. At the present time there are 21 national parks and 33 national monuments, with a total area of 15,846 square miles. For the 1929 fiscal year \$4,754,015 was appropriated for the administration and maintenance of the national parks and monuments, and in addition \$4,000,000 was authorized for construction of roads and trails.

NATIONAL PARK AND MONUMENT SYSTEM ENLARGED

Since the submission of the 1928 annual report of the National Park Service, the total area of the national parks has been increased from 11,846 to 12,118 square miles and that of the national monuments from 3,723.7 to 3,728 square miles. These changes were caused through the establishment of new reservations and by boundary revisions, as indicated below.

GRAND TETON NATIONAL PARK ESTABLISHED

The creation of the Grand Teton National Park in the State of Wyoming, by act of Congress approved February 26, 1929, added the twenty-first national park to the system and brought to a successful termination a 31-year effort to give parkhood to the most spectacular portion of the Teton Mountain Range. The new park, located about 11 miles south of the southern boundary of Yellowstone National Park, has an area of approximately 150 square miles. The Grand Teton Mountain group, within the park area, is one of the noblest and most spectacular in the world, probably being more comparable with the Swiss Alps than other American mountain

ranges. On the west the new park borders the famous Jackson Hole country.

The park was dedicated to public use on July 29. The Governor of Wyoming and other State officials, members of the National Editorial Association, which had been holding a convention in Cheyenne, railroad officials, and others interested attended the dedicatory ceremonies held at String Lake in the shadow of the mighty Tetons.

YELLOWSTONE NATIONAL PARK

The area of Yellowstone National Park was enlarged by 78 square miles through boundary revisions on the north and east. Additions to the northwest corner included the drainage areas of certain streams emptying into the Gallatin River and those to the northeast corner included all of the headwaters of the Lamar River in the park. The east boundary was also changed to follow the crest of the Absaroka Range as a natural boundary line, to aid in good administration. These changes were in conformity with the recommendations of the President's Coordinating Commission on National Parks and National Forests.

LASSEN VOLCANIC NATIONAL PARK

Lassen Volcanic Park, in northern California, was enlarged by the addition of 39 square miles. The new area contains some interesting spectacles associated with the volcanic phenomena which was primarily responsible for the establishment of the park, and also includes some land which serves as a summer habitat for deer and was needed to provide adequate sanctuary and grazing ground for park animals.

ACADIA NATIONAL PARK

The area of the Lafayette National Park, on Mount Desert Island, Me., was enlarged to 16 square miles, and authority was given the Secretary of the Interior to accept donations of certain important headlands and islands off Mount Desert Island, in the act that also changed its name to Acadia. This latter change was in line with the policy of the department to employ where possible only such names as are descriptive of a park region or are associated with it from earliest times. Acadia, the name once applied to the region in which the park is located, is of native origin, coming from an Indian word apparently describing the region that was in use among the early fishermen and traders from the sea and that was brought back by them to Europe before recorded explorations of the area by either the French or English.

YOSEMITE NATIONAL PARK

Another boundary adjustment that has been authorized, but has not yet actually been effected, is in Yosemite National Park, where the President is empowered to add an area containing magnificent sugar pine stands in the watershed of the South Fork of the Tuolumne River. The area to be added will be about 7,000 acres. The bill authorizing this addition was introduced in the House of Representatives by Representative Englebright on February 21 and in the

Senate on February 23 by Senator Johnson. On March 3, 10 days after its introduction in the House, the legislation received the approval of the President.

NEW ARCHES NATIONAL MONUMENT

The thirty-third national monument of the system administered by the National Park Service was established last April when President Hoover signed the proclamation creating the Arches National Monument, in Grand County, Utah. The new monument has an area of 4,520 acres. In it are extraordinary examples of the work of wind erosion in the form of gigantic arches, natural bridges, window openings, balanced rocks, and other unique wind-worn formations, which it is desired to preserve because of their educational and scenic value.

With the addition of this new monument the total area of the national monuments administered by the National Park Service is 3,728 square miles.

PROPOSED PARK BOUNDARY ADJUSTMENTS

Studies continued to be made of certain existing national parks to ascertain the desirability, from either a scenic or an administrative standpoint, of adjusting their boundaries.

YELLOWSTONE NATIONAL PARK

The most important boundary survey undertaken during 1928-29 was that made by the new Yellowstone Boundary Commission appointed by President Hoover under congressional authorization to determine the advisability of further changing park boundary lines, with particular reference to the southwestern and southeastern sections. The addition of the Upper Yellowstone region, long proposed by park authorities for addition on the southeast, would give a natural boundary to this portion of the park and at the same time would add some exceedingly interesting rugged wilderness country which possesses national-park characteristics. In the bottoms along the rivers and creeks in this section the moose native to the region find their most favored feeding grounds, and the addition of the region to the Yellowstone could be justified on the ground of protecting the moose, were it not for its scenic quality. The Upper Yellowstone country, with the adjacent portion of the present park, constitutes one of the largest wilderness areas remaining in America, and it is proposed to keep it in its wild state if added to the park, never permitting the construction of roads, hotels, or other such modern structures.

The Bechler River Basin, in the southwestern corner of the park, has long been desired by irrigation interests in eastern Idaho for use as a reservoir site. This has been consistently opposed by the National Park Service. These differences of opinion culminated in referring the entire question to the boundary commission for an impartial opinion.

The members of the President's commission carefully investigated both these areas during the summer, and it was my privilege to accompany them through the Upper Yellowstone country. Repre-

sentatives of the Forest Service also were with them during the greater part of the trip. The commission is now engaged in collecting further data. No report has as yet been submitted. On the commission are Dr. E. E. Brownell, of San Francisco, and Dr. T. Gilbert Pearson, president of the National Association of Audubon Societies, both conservation experts; Dr. Arthur Morgan, president of Antioch College, an outstanding engineer; C. H. Ramsdell, of Minneapolis, a landscape architect of high rank; and Arthur Ringland, a forest expert. The submission of their report is looked forward to with great interest.

ZION NATIONAL PARK

During the past year, and previously, approximately 25 sections of land adjacent to the east and south boundaries of Zion National Park have been withdrawn from settlement by Executive order in order that the area contained therein might be given consideration for addition to the park. Part of the withdrawn lands contains scenery of unusual magnificence, while a portion of it contains typical cliff-dweller ruins in excellent condition. The extension proposed would also bring into the park an area which is ideally suited for a game preserve and in which the native animals could roam unmolested. I sincerely trust that a bill for this boundary revision may be introduced in Congress during the winter and receive speedy favorable action.

BRYCE CANYON NATIONAL PARK

Considerable study also was made of a possible adjustment of the Bryce Canyon National Park boundary lines. The breaks in the pink cliffs which form the main Bryce Canyon extend for a distance of about 25 miles in a southerly direction from the present park boundary. At least 12 miles of these scenic breaks should be included in the park. The main problem confronting us is the question of finding the logical point for the park boundary, considering the scenic values and topographic features.

EASTERN NATIONAL PARK PROJECTS

As discussed in previous annual reports, the establishment of three new eastern national parks upon certain conditions was provided for by acts of Congress in 1926. These were the Great Smoky Mountains National Park, in the States of North Carolina and Tennessee; the Shenandoah National Park, in the State of Virginia; and the Mammoth Cave National Park, in the State of Kentucky. All three areas had been inspected and reported on favorably by the Appalachian National Park Commission appointed by the Secretary of the Interior. Subsequent to the rendering of its reports to the Secretary of the Interior, the Director of the National Park Service, at the request of the Secretary, reviewed on the ground the findings of the commission in the case of the proposed Shenandoah and Great Smoky Mountains Parks and informed the Secretary they measured up to national-park standards. The Director of the National Park Service did not have the opportunity to inspect the Mammoth Cave area before the authorization bill passed Congress. Interesting progress has been made in all three projects during the year. As



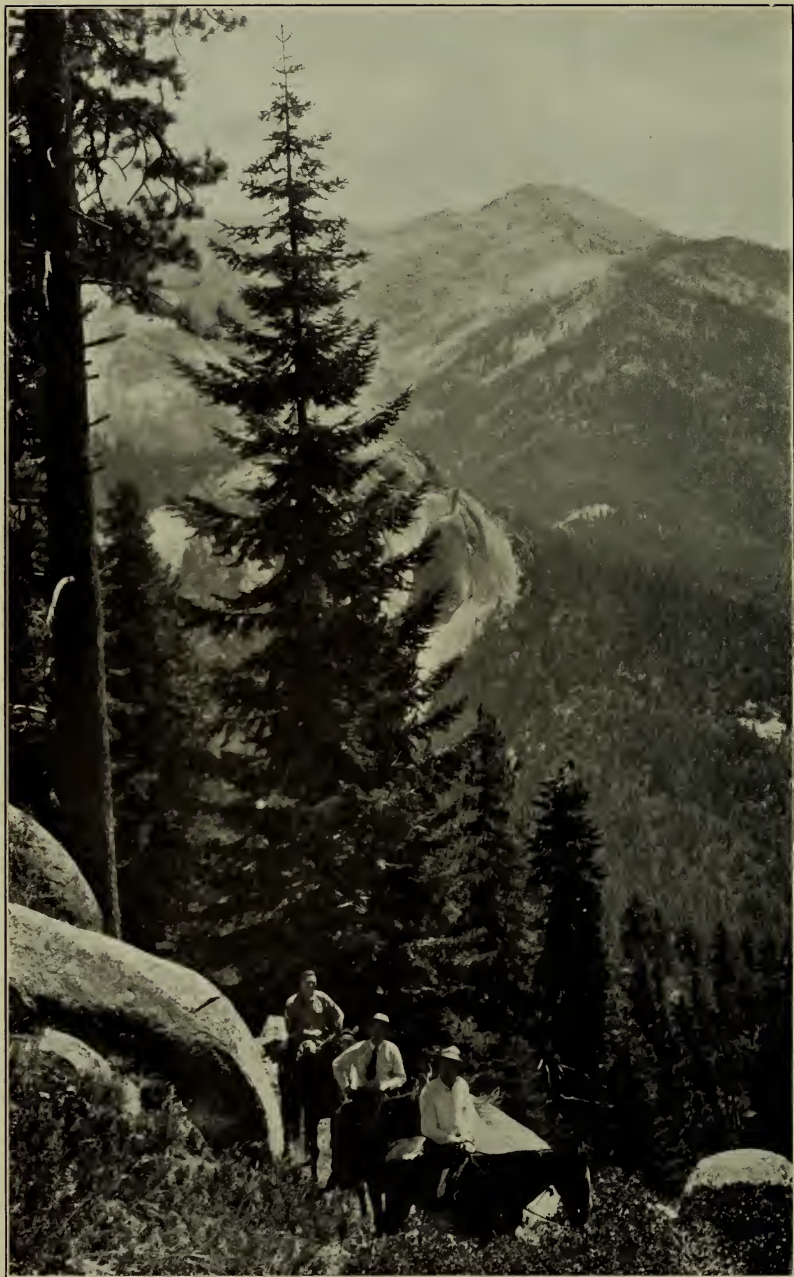
PHOTO BY CRANDALL

SCENE AT DEDICATION OF NEW GRAND TETON NATIONAL PARK



PHOTO BY CRANDALL

SPEAKERS' PLATFORM WITH GIRLS FROM "DUDE RANCH" SEATED IN FRONT
GRAND TETON DEDICATION



LLOYD PHOTO

ON THE NEW HIGH SIERRA TRAIL
SEQUOIA NATIONAL PARK

provided by law, none of these parks will be established until the prescribed lands have been donated to and accepted by the Secretary of the Interior for park purposes. In handling matters in connection with these eastern park projects, Associate Director Cammerer has been the personal representative of the Secretary of the Interior.

Under appropriations supplied by Congress, the Geological Survey has been engaged in topographical mapping of portions of the proposed park areas, particularly where more detailed topographic mapping of the portions inside the park lines were involved, and excellent progress has been made. Unfortunately, some of the available maps, prepared many years ago, upon which the laying out of the boundary lines had to proceed, were found inaccurate and unreliable in important respects, necessitating a complete rechecking and resurvey on the ground.

PROGRESS ON SMOKY MOUNTAINS PROJECT

Measuring up to their responsibilities, the States of North Carolina and Tennessee by adequate State laws created responsible State Park commissions to handle all problems affecting the acquisition of lands for the proposed Great Smoky Mountains National Park, including the handling of funds. Furthermore, by appropriations by the two States and pledges from their citizens, over \$4,500,000 had been made available toward accomplishing the creation of the park. Impressed with the high scenic qualities of the area involved and the efforts made locally to establish the park, the Laura Spelman Rockefeller Memorial, "in memory of Laura Spelman Rockefeller," contributed not exceeding \$5,000,000 toward this purchase fund, agreeing to match dollar for dollar contributions by the two States and their citizens. The total amount thereupon available for the acquisition of the minimum area for the proposed park was considered sufficient, upon expert appraisals, to acquire the acreage of 427,000 acres, which was the total minimum area within the taking lines prescribed by the Secretary of the Interior.

At this writing actual land acquisitions and options for land requiring only search and establishment of fee simple title to pass payment have been acquired by the States amounting to more than half the total minimum acreage of 427,000 acres. One hundred and fifty thousand acres will soon be tendered to the Secretary for administration and protection under the terms of the organic act but not for development. Not until 277,000 acres additional have been accepted by the Secretary of the Interior may the development of the area as a national park begin. Under the terms of the act the park may be expanded from the minimum of 427,000 acres to anywhere within 704,000 acres, depending upon the availability of funds.

It is believed that with the progress made on the proposed Great Smoky Mountains National Park project recently, all of the necessary lands will have been acquired within about two years.

In the acquisition of such a large area for national-park purposes, no laws or precedents were available to these States, and the pioneer work they have been doing along these lines is subject to the highest praise. Especially praiseworthy were the efforts put forth by the respective State commissions to stop all timber cutting within the area as quickly as possible in order that the wonderful forest growth might be preserved.

THE SHENANDOAH PROJECT

The boundary line to inclose the minimum of 327,000 acres required for the Shenandoah National Park was, at the request of the State of Virginia, studied and laid out on the ground. At this writing more than half of the total amount estimated as necessary to acquire this minimum area has been pledged, and it is hoped by the State officials in charge of the project that the remainder soon will be forthcoming from public-spirited citizens, so that the work of actually acquiring the land may be undertaken speedily. President Hoover, in order to provide a summer camp in the mountains that would be easily accessible to Washington, purchased a site within the proposed Shenandoah National Park. This, I understand, he eventually plans to turn over to the park as his personal contribution.

THE MAMMOTH CAVE PROJECT

Through the efforts of the Mammoth Cave National Park Association in obtaining subscriptions for use in purchasing lands in the proposed Mammoth Cave National Park area, I am informed that approximately \$800,000 in funds have been obtained, in addition to promises of donation of cave properties and lands valued at between \$300,000 and \$350,000. Among the latter, the Louisville & Nashville Railroad Co. has agreed to donate Colossal Cavern, one of the great cave units of the Mammoth Cave region, together with about 3,400 acres of contiguous lands. The Mammoth Cave National Park Association informs me that it has already purchased for park purposes a two-thirds interest in the original Mammoth Cave property, in fee, covering the original and vast Mammoth Cave system and surface lands. The cost of this two-thirds interest was about \$406,000, and negotiations are under way for the acquisition of the other one-third interest in the original Mammoth Cave property. In addition to the above, another area of about 10,000 acres has been acquired by the association for national-park purposes. Summed up, there has been subscribed in money and property thus far something like \$1,100,000.

INVESTIGATIONS OF OTHER PROPOSED PARK AND MONUMENT AREAS

Congress has been following the policy of providing by legislation for investigation of certain areas suggested for national-park status before passing laws actually establishing the parks. In line with this constructive policy, an act was passed and approved during the year providing for an investigation and report by the Secretary of the Interior on the advisability and practicability of establishing a national park in the Everglades of Florida. Another bill under consideration contemplates a study of the highlands of the Mississippi in northeastern Iowa and Wisconsin.

It has not yet been practicable to make an investigation of the proposed Tropic Everglades National Park in the State of Florida, first, because of lack of funds, and later, because when funds became available climatic conditions were unfavorable to making the inspection on the ground. It is planned to undertake this investigation during the coming winter.

Under instructions from the Secretary of the Interior, Associate Director Cammerer recently joined representatives of the States of Minnesota, Wisconsin, Illinois, and Iowa in a brief informal inspection of portions of the Mississippi River Valley and adjoining bluffs in the State of Iowa, the area outlined for investigation in Representative Haugen's bill now pending in Congress, with the idea of including it in the proposed Upper Mississippi National Park. Mr. Cammerer has recommended that when this bill is submitted to the department for report it be amended so as to include for inspection territory along the Mississippi River in adjoining States. He believes the study of the park project should include in one unit a typical cross section of the Mississippi River from Bellevue, Iowa, to Lake Pepin, near Red Wing, Minn., and also many of the bluffs and some of the still primitive prairie land adjoining the bluffs on top.

Authority of Congress was granted by the Seventieth Congress for the establishment of a Bad Lands National Monument in the State of South Dakota upon the conditions that certain private lands within the proposed boundaries are donated to the Federal Government and the State provides a road satisfactory to the Government.

Investigation was made during the late spring of an area in the vicinity of the Moapa and Virgin Rivers in southwestern Nevada which contains interesting prehistoric ruins. Pending the investigation and final report 144,000 acres of land in the vicinity were withdrawn from settlement. Formal report on the area has not yet been submitted, owing to the desire of the investigators to secure additional data. Preliminary reports indicate that at least a portion of the area containing the ruins known as the Puéblo Grande de Nevada, or Lost City, will be recommended for monument status.

THE OUACHITA PROJECT

The Ouachita National Park project is still pending through a bill introduced in the first session of the Seventy-first Congress by Representative Wingo, of Arkansas. The area proposed for inclusion in this park project was examined on the ground jointly by representatives of the National Park and Forest Services, and later was investigated again by a special representative of this bureau. Both these investigations proved that the area contains no distinctive scenic or other features within national-park standards. An adverse report on the project was submitted to Congress by the Secretary of the Interior. The bill, however, passed both Houses of Congress and was submitted to President Coolidge for approval, but it failed to receive executive approval before the close of his administration.

It is my earnest hope that this area will not become a national park. That it is interesting and even beautiful, with its combination of streams, hills, and forest cover, is not denied. It has not, however, that distinctive character which is so essential to all national-park projects if the national park system is to retain its position of preeminent importance in the scenic world. I believe the area should be considered for State park development.

TRANSFER OF MILITARY PARKS AND MONUMENTS NOT AUTHORIZED BY SEVENTIETH CONGRESS

The proposal to transfer 10 national military and other parks and 9 national monuments from the jurisdiction of the War Department to that of the National Park Service, as agreed upon between the Secretaries of War and Interior, was not reported to the House of Representatives by the Committee on Military Affairs during the last session of the Seventieth Congress, so failed of accomplishment. As mentioned in the last annual report of the National Park Service, this bill passed the Senate during the first session.

It is believed to be a logical development of the National Park Service to include the national historical parks and monuments as a part of the national park system, and to manage these areas under a uniform policy and a single administration. It was because the Secretaries of War and Interior believed the present divided responsibility for the management of park and monument areas under the two departments fundamentally unsound that the transfer was originally suggested, and I heartily recommend that the question again be taken up upon this basis. The National Park Service was established to preserve for all time areas of historic, scientific, and scenic importance, which most assuredly would include the national military parks and monuments under consideration for transfer.

THE PRIVATE LAND SITUATION

The private land situation has been one of the most serious problems facing the National Park Service during the past few years. Of the 19 national parks in continental United States, 12 contain a certain acreage of private-land holdings which are a distinct menace to good administration and future development. This situation came about through patents having been issued for lands in these areas before they were considered for national park purposes. Naturally the owners were protected in their rights when the parks were established.

In the early days of park development, when visitors were few, the importance of eliminating such private holdings was not realized. Since the automobile has come into such general use, however, and travel to the parks has grown so tremendously, the private-land problem has assumed serious proportions.

In Yosemite National Park alone, as originally established in 1890, there were 50,000 acres of privately-owned lands, which were concentrated largely along the western border of the park and consisted of lands principally valuable for timber. Realizing even then that such extended private holdings constituted a serious obstacle to effective protection and administration, the Secretary of the Interior in 1904 appointed a commission to study the park boundaries. Acting in accordance with the recommendations of the commission, Congress in 1905 eliminated approximately 500 square miles from the park, including 30,000 acres of the private lands. The remaining 20,000 acres, mostly in isolated groups, did not seem at that time to be in danger of logging because of comparative difficulty of access, but improved transportation facilities soon brought them within easy reach and again the problem arose.

Sequoia National Park was especially threatened because many of its noblest stands of the magnificent Sequoias or big trees were in private ownership. As this situation was acute, Mr. Mather, through personal donations and by securing other private contributions, consummated the purchase of these lands. In this case Congress also helped, in 1917 appropriating \$50,000 for the purchase of some 600 acres of land in the heart of the Giant Forest. As this appropriation was not sufficient to buy the entire tract, the National Geographic Society met the emergency, and donated \$20,000 to make up the deficit.

Glacier Park, when created in 1910, also had large private-land holdings amounting to about 10,000 acres, concentrated to a large extent along the shore of Lake McDonald. Some holdings in this park and in Zion and Mesa Verde have also been acquired through private contribution. After assisting in the Giant Forest purchase, 11 years passed before Congress again appropriated funds for the acquisition of private lands. Then, in 1928, a general policy of acquisition of these holdings was inaugurated through the congressional appropriation of \$50,000, which was conditioned upon each dollar of Government funds expended being matched by contributed private funds. Again in 1929 a similar appropriation was made. While a few small holdings were acquired as a result of these appropriations and contributions, it became apparent that if real results were to be obtained further action was necessary. The integrity of the national park system was being threatened through the inability of the service to control private-land activities, which increase the forest fire hazard, threaten game protection, and permit the operation of various commercial activities wholly at variance with national park policy.

So Congress, in an endeavor to provide an immediate solution of the whole problem, included in the Interior Department appropriation act an item providing for the acquisition of all privately-owned lands in national parks and monuments. The item specifically appropriated \$250,000 in cash and provided authority for the Secretary of the Interior to contract to the extent of \$2,750,000 more, conditioned upon Federal funds being matched by private funds in equal amounts. Coincident with this legislation promises were received from private sources of donations amounting to \$1,000,000 to assist in the acquisition of the private timber lands in Yosemite National Park, and steps are now being made by the Government toward securing title to these lands, amounting to about 12,000 acres. Some other contributions, small in amount, however, have been made during the summer to assist in private-land acquisition, and there is a possibility that the whole situation eventually will be cleared up under this plan of financing.

I am afraid, however, that private funds in large amounts are going to be difficult to obtain. Men and women who have been very liberal in philanthropic activities and with whom we have discussed the national park land problem quite emphatically tell us that they feel that the Federal Government should round out the existing parks with its funds; that this activity is not one that needs private support. I am discouraged by the results of our general efforts to match the funds already authorized by Congress.

EDUCATIONAL DEVELOPMENT

Perhaps the most marked progress of the year has occurred in the development of the exceptional natural educational opportunities available in the various national parks. Nine years ago the possibility of developing these areas from an educational and inspirational, as well as a recreational, standpoint began to be dimly realized, and in a small, experimental way nature-guide and museum activities were undertaken in Yosemite National Park. The movement met with popular acclaim and at the same time attracted the serious interest of scientists. As a result, the National Park Service to-day has the cooperation, advice, and assistance of the leading educational and scientific organizations throughout the country.

As so often happens, the enthusiastic approval given by park visitors to the efforts of the National Park Service and cooperating educational specialists has started an endless chain. As public appreciation of our first feeble attempts to tell them the story of the parks led to the specialists first becoming interested in providing better facilities for study, so the new facilities have attracted much greater numbers of visitors, and last year there was a truly remarkable increase in the numbers of people participating in field trips and lectures and using the museums and nature trails. Now further developments are under consideration for the benefit of the hundreds of thousands who each year want to study nature in the national parks, the ideal outdoor laboratories.

At this point I want especially to commend the work of the individual members of the educational division, for the great increase in current service was handled without adequate additions to a greatly overworked but tremendously enthusiastic staff.

REPORT OF EDUCATIONAL COMMITTEE

The informal educational committee appointed last year to make a thorough study of the educational possibilities of the national parks continued its work throughout the year. A preliminary report, made to the Secretary of the Interior late in the winter, is so interesting and so full of practical suggestions for promoting the educational and inspirational aspects of park work that it is quoted below in full:

I. GENERAL PRINCIPLES FOR GUIDANCE IN STUDY OF THE EDUCATIONAL PROBLEM

In undertaking an investigation of the possibilities for educational work in national parks the committee recognizes that such a program can be carried out satisfactorily only if there be full understanding of the relation of the plan to the specific purposes of the park system. For guidance in its study the committee agreed upon the following expression of basic principles:

NATIONAL CHARACTER OF PARKS

1. National parks must be clearly of importance to the Nation as a whole. Their support and maintenance from Federal funds can be justified only on that basis. Where the special characteristics are of less than national significance parks should be supported by local interests.

DISTINCTIVE CHARACTERS

2. The distinctive or essential characters of national parks lie in the inspirational influence and educational value of the exceptional natural features which constitute the reason for existence of these parks. Outdoor recreation is



YAVAPAI OBSERVATION STATION
GRAND CANYON NATIONAL PARK



PARTY WITH GUIDE AT BRIGHT ANGEL POINT
NORTH RIM OF THE GRAND CANYON



AN EVENING CAMP FIRE
YOSEMITE NATIONAL PARK



PHOTO BY MATZGER

A TYPICAL BEAR PIT SCENE
SEQUOIA NATIONAL PARK

recognized as an important factor in national park administration, but it is not the primary purpose, and can also be enjoyed through abundant opportunities furnished elsewhere. While primitive regions can not be provided to an extent sufficient for the future outdoor recreation needs of the whole people, those primitive areas with features of especial inspirational significance and educational value should be protected in fully primitive condition as national parks.

PRIMARY FUNCTION OF ADMINISTRATION

3. The primary function of national park administration concerns the use of the parks for their inspirational and educational values. The effort to give complete protection to those features which characterize the parks is necessarily a correlated responsibility. That aspect of administration concerned with defining and planning the opportunities to appreciate and interpret the primary features of the parks will naturally determine in major part the program and operation of other activities, such as those concerned with transportation, housing, subsistence, and recreation.

EDUCATION BASED ON ESSENTIAL FEATURES

4. The educational program in national parks should relate itself primarily to the essential features of the parks. Since the greatest possibilities for education arise through inspirational sources, these exceptional opportunities should be developed as fully as possible. Other accessory materials will be utilized, but it is important that they be used mainly in support and service of the factors of major interest.

As it is the exceptional features that warrant developing national parks and their special educational opportunities, activities of the Government in the educational work of national parks should not extend to other aspects of education which can be handled effectively by existing agencies.

OBJECTIVES OF EDUCATIONAL PROGRAM

5. It should be the primary object of the educational work to make possible the maximum of understanding and appreciation of the greater characteristic park features by the visitor, together with the stimulation of his thinking. Educational work should be reduced to the lowest limit which will give the visitor opportunity to discover the things of major interest, and to inform himself fully concerning them if he so desires.

The specific subjects toward which education in national parks should be directed comprise major problems of physical, geological, biological, and historical science represented there. The program should also include consideration of the beauty and meaning of nature in the aesthetic and spiritual sense, as illustrated in every expression of the outstanding phenomena represented.

SUPERLATIVE MATERIALS DEMAND HIGH PLANE OF EDUCATION

6. The superlative quality of the materials available for use in national parks makes it essential that educational work be conducted on the highest attainable plane of interpretation.

With the exceptional opportunity to initiate educational work on the basis of uniquely inspiring materials, it would be inexcusable if the possibilities were nullified by utilization of personnel unable to make use of the means presented. The unusual opportunity in national parks carries with it a large responsibility to illustrate for all educational effort in America the significance of inspiration in education.

UNITY OF PROGRAM—OUTSTANDING LEADERS

7. It is essential that there be unity of educational program for the whole National Park Service, and leadership representing the best knowledge and educational qualifications in the country. This leadership should reside in regularly appointed officials with large responsibility and authority, and in a carefully chosen board of outstanding students of problems of the parks. The board should have large powers and ample means for continuing study of the problem.

II. RECOMMENDATIONS ON ORGANIZATION

1. In view of the fact that the purpose of national parks is to be found in their inspirational and educational values, there should be an advisory body of five to seven of the ablest men conversant with national parks, appointed by the Secretary of the Interior, on nomination by the Director of National Parks, to serve without salary, whose duty it shall be to advise the Director of National Parks on matters pertinent to educational policy and developments in national parks.

2. There should be a division of education coordinate with other divisions of the National Park Service directed by a man with the best of scientific and educational qualifications who shall administer the educational program in the parks.

III. PROCEDURE OF THE COMMITTEE IN THE STUDY OF ITS PROBLEM

In examination of the problem of education in its relation to operation of national parks it has seemed wisest to give careful study to each of the special questions expressed through the peculiar opportunities in the parks. It also appeared important that examination be made of the educational possibilities of the parks individually.

As illustration of the method of approach to one aspect of this problem, the committee presents herewith a brief document, entitled "Memorandum Regarding Necessity for Further Research on Problems Involved in the Educational Program of National Parks."

As illustration of the method of approach in study of an individual park, there is presented a document, entitled "Recommendations Regarding Development of an Educational Program at Mount Lassen Volcanic National Park."

In consideration of the general plan of educational work in national parks, the committee has given attention to the opportunities in practically all of the parks, and has accumulated a large volume of data. These reports will be presented when further studies make it possible to digest and simplify the proposals.

In study of the best means for organization of an educational program, the committee has considered the opportunities under two heads:

(a) Service to the visiting public desiring to take advantage of the extraordinary opportunities of the parks;

(b) Service to educators and investigators attempting to obtain new information, or to increase their general or special knowledge of the phenomena represented in the parks.

There has been intensive study of the principal phases of work now under way and proposed for the national parks, such as, nature guide service, visual instruction, museums, and publications designed to serve as aids to visitors and investigators. Further report upon all of the matters mentioned will be transmitted as early as it becomes possible to work through to a satisfactory solution the problems under consideration.

In submitting this report to the Secretary, the committee wrote as follows:

The SECRETARY OF THE INTERIOR,

Washington, D. C.

MY DEAR MR. SECRETARY: The committee appointed in 1928 by the Secretary of the Interior for study of educational problems of national parks has visited the greater number of the parks and has taken up an intensive study of their educational problems. Inasmuch as it has been indicated that a period of two years may be used for this work, and many difficult questions are involved, it has seemed wise to take such time as may be needed for preparation of a thoroughly fundamental discussion of the subject. It is, however, agreed by the committee that a first report on certain general questions should be made at this time, it being understood that the recommendations here presented will be followed by detailed statements relating to specific subjects and to the special problems of individual parks.

The report transmitted includes the following materials:

"1. A statement of general principles agreed upon by the committee for guidance in study of the educational problem of national parks.

"2. A group of specific recommendations relating to organization of educational work in national parks, together with an outline of program for such work.

"3. Recommendations by the committee relative to method of initiation and development of an educational program for Mount Lassen Volcanic National Park, this being a park in which educational work has not been developed. The recommendations presented relative to this park may be considered both as covering a general type of organization and as having reference specifically to the needs of Mount Lassen Park."

The committee trusts that the statement presented herewith may serve a useful purpose in consideration of basic problems relating to national park organization. As rapidly as may be possible, the committee will forward the results of its further specific studies on individual parks, and on the various subjects which will naturally develop through an educational program in national parks.

Respectfully submitted.

HAROLD C. BRYANT.
HERMON C. BUMPUS.
VERNON KELLOGG.
JOHN C. MERRIAM.
FRANK R. OASTLER.

Shortly after the receipt of this report the Secretary of the Interior, acting on the recommendations contained therein, appointed an informal advisory board to assist the Director of the National Park Service on matters pertinent to educational policy and developments in the national parks. Doctor Merriam, who is president of the Carnegie Institution of Washington, accepted the chairmanship of this board. Associated with him are Dr. H. C. Bumpus, of the American Association of Museums; Dr. Vernon Kellogg, secretary of the National Research Council; Dr. Wallace W. Atwood, president of Clark University; Dr. Clark Wissler, curator of the American Museum of Natural History; Dr. Isaiah Bowman, president of the American Geographic Society; and Dr. Frank R. Oastler of New York, who has specialized in national park work for several years. All but three of these men were among the original members of the informal committee making the educational survey, and two of these, Doctors Atwood and Wissler, were added to the committee during the past year.

Studies were made in Yellowstone, Grand Teton, Glacier, Yosemite, Grand Canyon, Rocky Mountain, Sequoia, Crater Lake, Mount Rainier, Mesa Verde, and Acadia National Parks and in a number of the national monuments during the past summer by members of the educational committee.

It is planned by Doctor Merriman that the final report of the committee, which is functioning on a 2-year basis, may be made to the Secretary during the coming winter.

EDUCATIONAL DIVISION IN WASHINGTON ORGANIZATION PLANNED

Upon the recommendation of the advisory board, and with your approval, plans have been under consideration during the past few months for the establishment of an educational division in the headquarters office of the National Park Service at Washington properly to coordinate the various educational phases of park work. In order that such a division may be established and function as promptly as possible, an item covering the initial year's expenses has been included in the estimates of appropriations needed for the 1931 fiscal year. As now planned the division when formed will consist of two educational experts and the necessary stenographic and clerical help.

EDUCATIONAL PLANS DEVELOPED

Comprehensive plans for the development of general educational work in the national parks, stating the general principles of administration of the educational division as a whole, were carefully worked out and approved during the past year. This general plan is supplemented by individual plans outlining the educational activities for the various national parks. Several naturalists from the individual parks were detailed to the educational headquarters at Berkeley, Calif., during the winter to assist in the preparation of administrative plans for the current operation of the educational activities in their individual parks and to secure scientific data needed for the use of their local staffs. This proved to be an excellent method of training the educational personnel in their special fields of activity.

MUSEUM DEVELOPMENT

The American Association of Museums, which has taken such a keen interest in museum development in the national parks, continued to advise and assist in this work during the past year. The greatest museum activity was in Yellowstone National Park, where under a grant of \$118,000 secured a year ago by the Museum Association from the Laura Spelman Rockefeller Memorial, a definite policy of museum expansion was in progress. The museum of hydrothermal phenomena, begun last year at Old Faithful, was completed and put into operation. During the past season this was successful beyond all expectations, and it is proving to be one of the major educational features of the park. Illustrated lectures were given nightly in the court of the museum, the attendance sometimes reaching as high as 1,500 at one lecture. Construction of a smaller branch museum at Norris Geyser Basin is now in progress. This, like the one at Old Faithful, will be chiefly one of hydrothermal phenomena, but its exhibits will in no way duplicate those of Old Faithful, due to the differences in types of formations, hot springs, and geysers found in the two localities. Another branch museum now under construction is located at Madison Junction, at the confluence of the Firehole and Gibbon Rivers. In this museum, located near the site of the camp fire of the Washburn-Langford-Doane expedition of 1870, at which the fate of the Yellowstone was discussed and the national park idea first advanced, will be an exhibit telling the story of this camp-fire discussion and its far-reaching results. Both the Madison Junction and Norris Geyser Basin museums will be conducted as trail-side museums. Trail-side exhibits, lookouts, and other branch museums are being planned for other points throughout the park, each to be a unit of the general museum and educational development.

The museum at Yosemite National Park, established in 1924 through the cooperation and generosity of the American Association of Museums and the Laura Spelman Rockefeller Memorial, functioned excellently during the past season and served an estimated total of 439,852 people, by far the largest number that has yet used the museum. The Glacier Point Lookout also proved very popular during the season, as did the new branch museum installed at the Mariposa Grove of big trees.

An interesting museum was also made available to visitors to Lassen Volcanic National Park last summer, through the donation to the Government of a museum and 40 acres of land on which it stands by B. F. Loomis, of California. The museum, for which plans were approved by the landscape architectural division, is devoted to exhibits of the volcanic history of the area, including a photographic account of the latest eruptions of Lassen Peak. In a separate building, constructed on the same plan as the central museum, is an exhibition seismograph under glass, which is of great public interest. The seismograph instruments were installed by the Geological Survey of the Department of the Interior and are designed to measure earthquake shocks and tremors around the Lassen Peak regions.

The interesting museum at Mesa Verde National Park, made possible entirely through gifts from friends of the park, was immensely popular last season. Acquisitions to the museum during the year as a result of archeological investigations in the old cliff-dweller ruins are mentioned under the heading "Archeology."

Small museums were maintained at several of the other national parks, as well as at six of the monuments in the southwestern group. In these latter reservations the museum exhibits are not, as a rule, labeled. Instead the custodian or the guide shows visitors through both the ruins and the museum, explaining the various exhibits.

LIBRARIES IN THE NATIONAL PARKS

There is need for the establishment of libraries in the national parks for use by members of the educational staffs and also for the reference use of visitors interested in particular phases of natural history. The value of such libraries has been amply demonstrated by the use of the one maintained in connection with the Yosemite museum. During the past year many books were added to that library, and the small library in Yellowstone National Park was much enlarged. Considerable progress was made at educational headquarters toward the compilation of a bibliography of books on all the national parks.

LECTURES IN THE NATIONAL PARKS

Especially interesting were the lectures given in the national parks during the season at the hotels, lodges, and community buildings, and around the camp fires. Although covering scientific and technical subjects, these lectures were given in popular form so as to appeal to all listeners, whether scientifically trained or not. As an example of the type of men who are offering their services to assist in this work, last summer three popular scientific lectures on "The Past, Present, and Future of the Giant Sequoia" were given at Giant Forest in Sequoia National Park by Dr. Ralph W. Chaney, internationally known paleobotanist, under the auspices of the Carnegie Institution of Washington. Many teachers of note throughout the country are serving on the educational staff. More than half a million people heard the various lectures throughout the parks during the season.

FIELD TRIPS CONDUCTED BY RANGER NATURALISTS

As in the past, field trips, varying in length from an hour or so to several days, were offered visitors to the major parks by the ranger naturalist forces. So popular have these walks become, however, that the educational staff, despite some increase in personnel, has been entirely too small properly to handle the large number of people demanding this service. One ranger naturalist or guide can personally reach 20 to 25 persons on a field trip to great advantage, but when, as occasionally happens, several hundred people go on a single field trip it is impossible to give the desired attention to individuals along the trail. Therefore, one of the vitally important improvements for next year is an increase in the ranger-naturalist personnel.

SELF-GUIDING AND NATURE TRAILS

In an effort to supplement to a certain extent the personally-conducted trips, a number of self-guiding and nature trails have been laid out during the past three or four years. While they have proved very attractive to visitors, they have failed to achieve their purpose of relieving the congestion on the personally-conducted trips, for after using the self-guiding trails interest in educational matters becomes stimulated and visitors are more keen than ever to attend the rangers' trips. A number of new nature trails were developed during the past year by the chief park naturalist and volunteer assistants.

WILD-FLOWER GARDENS

In order that visitors unable, through lack of time or physical strength, to visit all parts of the park may see and enjoy as many varieties as possible of the exquisite wild flowers that abound in out-of-the-way places, wild-flower gardens have been constructed in several of the national parks. One such garden established during the past summer is at Giant Forest in Sequoia Park. Here, in a garden adjacent to the museum and administration building, about 70 species of wild flowers were transplanted and labeled. Some of these were carried many miles from the High Sierra country and others were brought up from lower elevations. All of them, of course, are native to the park. Other gardens have been established in Yosemite and Crater Lake National Parks. Especially interesting is the wild-flower garden around the Ahwahnee Hotel in Yosemite Valley. The first garden planted at the Ahwahnee was destroyed by deer, so with the permission of the Park Service a deer fence was constructed around the garden and it was replanted with native wild flowers. The Yosemite Park & Curry Co. has spent thousands of dollars on this garden, which is now about the only place in the valley where the native flowers may be seen in any profusion.

UNIVERSITIES AND COLLEGES CONDUCT FIELD CLASSES IN PARKS

Each year a number of prominent universities, both eastern and western, send field parties into the national parks to study natural history and allied sciences at first hand. The National Park Service welcomes all such classes and is keenly interested in promoting this educational use of the parks.



PHOTO BY JOFFE

MADISON JUNCTION BRANCH MUSEUM
YELLOWSTONE NATIONAL PARK

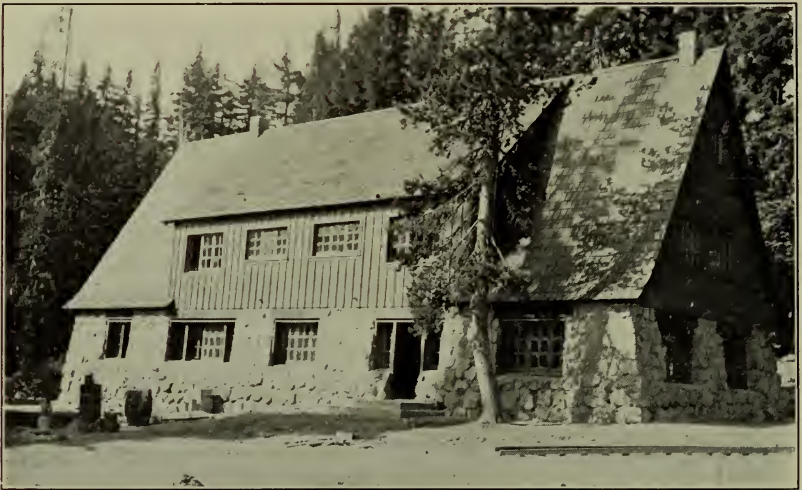


PHOTO BY ASAHIEL CURTIS

NEW ADMINISTRATION BUILDING AT LONGMIRE SPRINGS
MOUNT RAINIER NATIONAL PARK



NEW ADMINISTRATION BUILDING
GRAND CANYON NATIONAL PARK



NEW COMBINATION BUNK AND MESS HALL
CRATER LAKE NATIONAL PARK

FUNDS DONATED FOR PHOTOGRAPHIC ACTIVITIES

The National Park Service in its educational work and its service to magazine and newspaper writers has been greatly handicapped in the past because of lack of funds for obtaining photographs of park scenes for reproduction. Cooperation with the public utility operators in one or two of the parks has made available a fair supply of pictures of those particular areas, but in most cases the Washington office has had to depend upon donations for its photographs. This matter was laid before a friend of the parks last year by the chief park naturalist, with the result that sufficient funds were donated to establish a photographic division and provide for its operation until next July 1. At the request of the donor, the fund contributed for the purchase of photographic equipment and supplies is being administered by the trustees of the Yosemite Natural History Association, contributions being made to the National Park Service as needed. The photographer appointed under this grant has spent the summer in field work in the Southwest, making hundreds of negatives of scenes in the Grand Canyon, Mesa Verde, Bryce Canyon, Zion, and Sequoia National Parks and in the southwestern monuments.

It is hoped that next year Government funds will be available for photographic activities.

ARCHEOLOGICAL INVESTIGATIONS

The Mesa Verde National Park and several of the southwestern national monuments contain prehistoric ruins of great interest from an archeological standpoint. All investigations in these areas are carried on under the general authority of Jesse L. Nusbaum, archeologist for the Department of the Interior and also superintendent of Mesa Verde National Park.

Mr. Nusbaum personally conducted an archeological examination of ruins far south of the west rim of Wetherill Mesa, in the park, with funds provided by a park friend to finance annual expeditions of this nature. Excellent results were obtained in troweling and searching the débris left in one ruin after an early pot-hunting expedition. In addition to finding missing fragments of many pieces of pottery now in process of mending and restoring in the museum, an especially valuable find was made in gathering practically all the pieces of what has been considered by many archeologists the finest black-on-white seed jar ever found in the whole Southwest. Two previously unexcavated, depressed areas in one cave proved to be ceremonial rooms, one of them containing five prehistoric burials. Due to these annual archeological trips and the resultant labor spent in repairing and restoring the material found, the Mesa Verde Museum now contains the largest and most comprehensive exhibit on the archeology of the Mesa Verde National Park that is available for public inspection anywhere. Until recent years many museums both in the United States and abroad contained better exhibits than the park itself, because of the activities of pot-hunters in the days before the park was established.

A small amount of excavation work was done at the Chettro Kettle ruin in Chaco Canyon National Monument by the School of American Research of Santa Fe. Repairs were made by service

officers to prehistoric ruins in the Aztec Ruins, Chaco Canyon, Gran Quivira, and Montezuma Castle National Monuments, and to the old fort house at Pipe Spring and the Tumacacori Mission, relics from the days of early white settlements of the Southwest. The department archeologist cooperated with the superintendent of southwestern monuments and various monument custodians in planning repair and preservation work.

FOREST PROTECTION

Forest protection work is mainly devoted to the protection of the park trees against fire, insects, tree diseases, and other injury. Last winter a forestry policy was codified and now forms the basis for forestry activities in the national parks.

The Director of the National Park Service continued to act as a member of the forest protection board, organized under an order issued by the Chief Coordinator in January, 1927. The purpose of this board, as broadened with the approval of the coordinator, is to formulate and recommend general policies and plans for the protection of the forests of the country, through the prevention and suppression of forest fires, tree diseases, and insect and rodent infestations.

Upon the recommendation of the National Park Service, regional boards were organized representing the different Federal agencies concerned in carrying out the purposes of the board. The national park superintendents served as members of these regional boards, and in some cases acted as chairmen. A close study of the entire situation in each region has been made by each regional board and definite joint plans made for the necessary protective work. The activities of these boards have resulted in a better understanding, particularly of the insect, tree disease, and rodent situations on publicly administered lands.

THE FIRE MENACE

Realizing the fact that fire is the most serious menace threatening the splendid park forests, last year a fire-control expert was appointed to survey the entire situation. Working under the general supervision of the chief park naturalist and forester, he made detailed surveys of the fire hazards in Glacier, Sequoia, Yosemite, Mount Lassen, Crater Lake, and Mount Rainier National Parks, and several of the national monuments. Based on these surveys, comprehensive plans have been made for the prevention and suppression of forest fires in these areas. The plans for Glacier, Sequoia, Yosemite, and Lassen Volcanic Parks were put into effect during the past season, resulting in greatly increased efficiency in fire control.

Fire schools were conducted in several of the parks by the fire-control experts, and in addition national park rangers attended fire schools conducted by the Forest Service at near-by national forests. So effective were the control methods employed that fires originating within the national parks were held down to a minimum despite the fact that the abnormally dry conditions during the summer increased the fire hazards in the majority of them.

GLACIER PARK FIRE

The most disastrous fire of the year occurred at Glacier National Park, which up to the time this fire swept into the park from the outside had a remarkable record. Thirty-nine other fires, mostly caused by lightning, were detected in or near the park and suppressed so quickly and efficiently that the largest burned an area of only 4 acres. On August 16, however, a fire broke out in slashings on privately-owned lands 10 miles outside the park, spread into both the Blackfeet and Flathead National Forests, and on August 20, under a high southwest wind, entered the park near the administration headquarters at Belton, jumping the river on a half-mile front and running 10 miles between 2 p. m. and midnight. Being a high crown fire of the most destructive type, human agency was incapable of stopping it. Missing park headquarters by less than a mile, it traveled toward the town of Apgar, where a number of buildings were burned and 2 miles of the shore line of Lake McDonald were ruined. In all 50,000 acres of park forest were destroyed, 10,000 acres of which were old burns upon which reproduction had started. The fire-control expert reached the park the day after the fire crossed the line, facing a most discouraging situation with fire out of control on both sides of Lake McDonald and the North and Middle Forks of the Flathead River. Later in the week the superintendent of Yellowstone National Park with seven firefighters and considerable equipment motored to Glacier to assist in the struggle. The superintendent of Glacier National Park reports that excellent assistance was given by the Great Northern Railway. Trains brought in extra men twice daily during the height of the fire, but many of these deserted in the face of the gruelling work to which they were subjected. The American Legion also cooperated by sending in many men. A Montana State official who was at the scene of the fire stated it resembled movements of troops during the World War. Virtually every highway on the west side of the park or leading to it was jammed with trucks and men being rushed to the front-line fire defenses.

A lessening of the high winds and greater humidity finally enabled the firefighters to get the fire under control, first at night, and later in the day, until finally it came under control early in September when rain fell.

I can not commend too highly the magnificent work done by the park superintendent and the park forces in fighting this fearful fire. Everything that human beings could do, they did, and had their work not been done so efficiently both before and during this conflagration, many acres more of valuable park timber would have been included in the holocaust. As you stated after your inspection of the scene of the fire, the skill and persistence of the superintendent and his associates in guarding Glacier National Park in this emergency will be keenly appreciated by all visitors to the park, as from the scenic standpoint, they will find it not so conspicuously injured as one might expect it to be.

Great as is the need for additional protection forces and fire protection, roads, trails, and other improvements within both national parks and national forests, such national reservations will be unable adequately to protect their lands against the inroads of fire originat-

ing on private lands either within or without so long as the present laxness with regard to proper slash disposal and operation of engines in the woods during periods of high fire hazard is permitted to continue on private holdings. Only through the combined efforts of all agencies, Federal, State, and private, can a proper protection program be worked out that will prevent a repetition of the circumstances which made possible this catastrophe.

INSECT AND TREE-DISEASE CONTROL WORK

The effectiveness of insect control measures taken by the Bureau of Entomology and the National Park Service during recent years became evident this past season, when infestation conditions in several of the parks recently under control were found better than for several years past. Both Yellowstone and Yosemite National Parks were free from serious epidemic infestations, although a certain amount of control work was necessary in both these areas.

The most serious insect infestations occurred in Crater Lake and Glacier National Parks. In the former an especially severe attack by the mountain pine beetle required prompt suppressive measures, while a survey of the white pine near headquarters in Glacier Park, made by representatives of the Bureau of Plant Industry and the Bureau of Entomology, showed a serious condition. In fact, it is the opinion of these experts that unless prompt and drastic steps are taken to eradicate the infestation, the white pine stands in the Lake McDonald district are doomed.

Field investigations to determine the seriousness of the infestations generally are conducted by Bureau of Entomology experts and control measures planned and supervised by them, although the work is actually carried out by Park Service employees. Last summer the park naturalist and chief ranger of Yellowstone Park attended a class of instruction conducted by the Bureau of Entomology at Wisdom, Mont., for the purpose of obtaining information on the mountain pine beetle, and at present an intensive survey is being made to discover whether this insect has entered the park from infested areas outside.

The most important tree disease threatening the forests of the national parks is the white pine blister rust. An intensive survey of the rust situation in Acadia National Park was made by the office of blister rust control of the Bureau of Plant Industry, and careful plans made for its eradication. Expert field examinations for this tree disease were also made in Mount Rainier and Glacier National Parks.

PRESERVATION OF PARK LANDSCAPE

The landscape architectural division continued to supervise all work affecting the park landscape, such as the location of roads and the location and type of bridges, buildings, and other structures. Although enlarged during the year, this division was still handicapped by not having sufficient personnel to give broadgauge treatment to park landscape problems. Such problems can not be solved by a casual inspection. Therefore one of the needs of the future is a landscape personnel large enough to assign an architect

to one park for an entire season, or longer if necessary, to enable him to familiarize himself with the entire area of the park and become acquainted with the local conditions, the development plans of counties and States in connection with approaches to the park that have such a bearing on the future, proposed adjustments in park boundaries, and the plans for public operators for many years ahead.

During the year a general revision was made of the specifications covering the landscaping features on road construction. In the past a specification has been made for each project, but under this new procedure standard specifications were drawn up covering such points as are common to every construction job. To supplement these general specifications, a check list of points applicable to particular types of work was also made up. This will be of valuable assistance in the future in checking plans from a landscape angle.

Winter use of certain of the national parks has brought about an entirely new perspective of developments and improvements on the part of park officers. Whereas formerly construction was planned primarily for summer use, it is essential in the future, in all parks where winter-sport use is encouraged, that no construction or development be undertaken that does not fully consider its use under winter as well as summer conditions. While this will necessarily involve larger appropriations at the time of construction, it will avoid waste later on.

Roadside clean-up was continued in Yellowstone National Park both with Federal funds and donations. Approximately 69 miles of roadsides have been cleaned to date, 45 miles with donated funds. This work has included the removal not only of logs and other debris of that nature along the roads, but also of obsolete structures such as sprinkling tanks and pipe lines. Roadside clean-up has also been continued in Crater Lake Park under an allotment of Government funds. Some planting was also done here to eliminate dust.

The landscape division has in course of preparation a schedule of data pertaining to the planting needs of both the park administration and the public operators at Yellowstone National Park, with the idea of inaugurating a definite planting project.

EXPERT ADVISERS CONTINUE STUDY OF YOSEMITE

The board of expert advisers appointed under congressional authority to study and assist in the solution of problems in connection with the management of Yosemite Valley continued its painstaking study of conditions in the valley during the past year. The original members, Duncan McDuffie, John P. Buwalda, and Frederick Law Olmsted, continued to serve. While some of their decisions have relieved situations that are immediate, in the main their studies are directed toward the future development of the valley.

The proposal to build a cableway from the floor of Yosemite Valley to Glacier Point, so often advanced, was given thorough study by the board of experts. While agreeing that some suitable rapid means of mechanical transportation between the valley floor and Glacier Point would be very advantageous to the best enjoyment of the park by the public, it was felt that the disadvantages from an esthetic standpoint would far outweigh the usefulness of a cable.

Expressing, as it would, man's dominance over nature, it would be the very antithesis and contradiction of the main theme of nature for which Yosemite Valley is famous, and would involve a critical loss of the majesty of the valley walls. It is the opinion of the experts that the possibility of direct mechanical connection of the valley with the rim by some invisible means, piercing behind the granite of the walls, deserves further serious study.

Other matters investigated and studied during the year included the parking space and entrance lay-out at Camp Curry, plans for the proposed new Yosemite Lodge, the location of the new Wawona Road, the problem of winter camping and parking, as well as numerous other matters important from a landscape or public-use point of view.

Not only Park Service authorities, but the general public using Yosemite Valley as well, are deeply indebted to these experts for the attention and time they have given to matters of park development and preservation. It is a public service, willingly given, that entails much sacrifice on the part of the individual members.

CONDITION OF PARK FAUNA

Wild-animal conditions in the national parks have been excellent, owing to the generally favorable winter weather and good forage crops. Increases in the various species are reported from the majority of the parks, and this is especially true in the case of bears both black and grizzly. Mount McKinley National Park in particular reports great increases in the big game animals under the protection which the park authorities are now able to furnish. The repeal, by act of Congress, of that section of the organic act establishing the park which permitted prospectors and miners in the area, when actually in need of food, to hunt park animals is primarily responsible for this increase. The abuse of the privilege had become so serious that there was a severe drain on the wild animal herds and the difficulties of park administration were greatly augmented until Congress granted this relief.

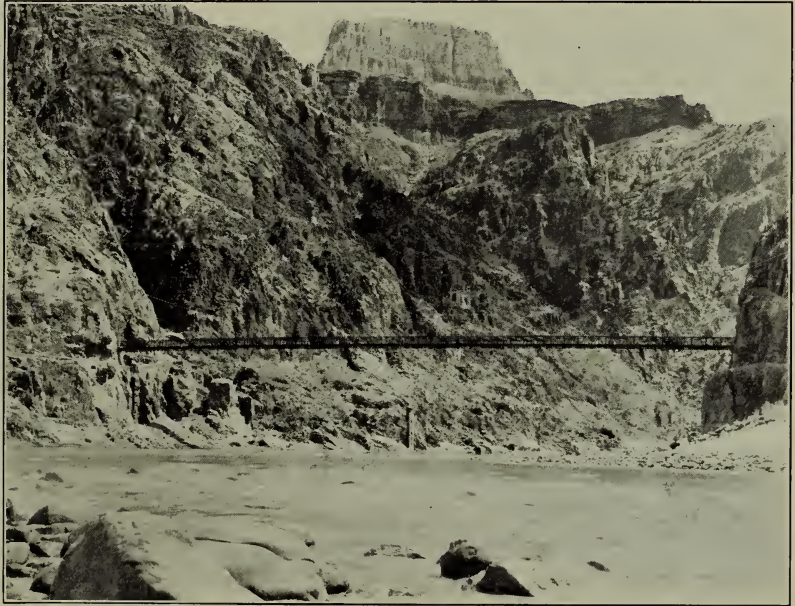
The Yellowstone buffalo herds are increasing at such a rate that authority has been requested to dispose of some of the bulls and cows in addition to the steers. So far this year 100 steers were slaughtered for market purposes. The animals in the small wild herd gradually have been mingling with the main Lamar River herd, so that it has become difficult to distinguish between the two groups.

In Yosemite Valley deer have become so numerous as to be quite destructive of plant life. In the higher country, however, especially in the Tuolumne watershed, these animals have not yet recovered from the decimation they suffered from the hoof-and-mouth disease epidemic of 1924.

The Kaibab deer herd on the north rim of the Grand Canyon still continues to present a serious problem. Detailed examinations of the winter range made during the summer by representatives of the Biological Survey and the National Park Service showed the forage crops used by the deer to be heavily overgrazed, partly because of the long-continued drought. It therefore seems that some reduction in the Kaibab herd will be necessary this year, but park



BRIDGE ACROSS GOOD-BYE CREEK
CRATER LAKE NATIONAL PARK



COURTESY FRED HARVEY

NEW SUSPENSION BRIDGE ACROSS THE COLORADO RIVER
GRAND CANYON NATIONAL PARK



HAPPY ISLES BRIDGE
YOSEMITE NATIONAL PARK



BRIDGE ACROSS TWO MEDICINE CREEK NEAR TRICK FALLS
GLACIER NATIONAL PARK

authorities believe this reduction should be made by means of trapping and shipping deer to ranges elsewhere in the country. In line with this thought during the past two seasons fawns from the Kaibab herd have been trapped and transported by truck to the south rim, where they have done splendidly and been of great interest to visitors. It is planned to continue the transportation of fawns again this winter, and free transportation by airplane for these little animals has been offered by the airplane company operating a sight-seeing line across the canyon.

The antelope imported from Nevada several years ago and placed on the Tonto Plateau of the canyon are holding their own.

STUDIES OF WILD-ANIMAL PROBLEMS CONDUCTED

A number of interesting studies of the wild-animal situation in the national parks were inaugurated during the past year through the cooperation of interested organizations and individuals. A comprehensive 2-year survey of the wild life of all the national parks has been made possible through the generosity of George Wright, who has been connected with the national parks for several years. Mr. Wright is personally bearing the entire cost of this investigation, the object of which is to study first such outstanding problems as those of the bear and deer in Sequoia and Yosemite Parks, the elk situation in Yellowstone and Yosemite, and the mountain sheep, caribou, wolf, and coyote problems in Mount McKinley. Special emphasis will be laid on the relation of predatory animals to other members of the park fauna, and problems arising through the increasing human occupancy of our national parks and the resultant effect upon the native fauna and flora will also be studied. Joseph Dixon, of the California Museum of Vertebrate Zoology, is directing the survey.

With funds provided through the generosity of another park friend, Mr. Thomas Cochran, of New York, a special survey of the Yellowstone elk herds and the life habits of these animals was conducted by William Rush, of the Forest Service. Studies of both winter and summer conditions were made. Dr. O. J. Murie, of the Bureau of Biological Survey, also conducted extensive investigations of elk conditions in the Jackson Hole. Both Mr. Rush and Doctor Murie, as well as park rangers, met with representatives of the Wyoming, Montana, and Idaho fish and game commissions at Mammoth Hot Springs last July and gave accounts of their investigations to the commissioners. Many valuable points relative to better management of the elk herds were brought out during the discussions.

The Museum of Vertebrate Zoology of the University of California continued a survey of the animal life of Lassen Volcanic National Park under the direction of Dr. Joseph Grinnell, the results of whose work are soon to be published by the University of California.

PREDATORY ANIMAL CONTROL

Animals that prey upon the deer, elk, antelope, and other animals that add so much to the pleasure of park visitors are classed as predatory. This includes particularly the coyote, wolf, and mountain lion. While no species of animal indigenous to a park is ever

exterminated, those that prey too heavily upon the weaker animals are reduced in number, in an endeavor to retain as nearly as possible the balance of nature. Coyotes are the especial bane of the Yellowstone animals, and it was necessary to destroy 288 during the year. In Mount Rainier both cougar and coyote were apparently less numerous, with the bobcat and lynx about holding their own. The campaign against the wild burros which have been destroying the flora of the Tonto Plateau at the Grand Canyon, begun in 1924, was continued. A marked improvement in the plant life, not only of the Tonto Plateau but in the entire area within the Canyon proper, has benefited greatly by the elimination of over a thousand burros during this time.

FISH-CULTURE WORK

The first step in coordinating fish-culture work in the national parks was taken last summer when, through a cooperative arrangement effected between the Department of Commerce and the Department of the Interior, a fish culturist was detailed by the Bureau of Fisheries to supervise fish-culture operations in the national parks and monuments. Under the plan of cooperation the fish culturist will devote his time during the summer to piscatorial problems in the national parks, and during the winter months will direct fish-cultural operations at hatcheries of the Bureau of Fisheries located at points outside the parks. His salary will be borne by the Bureau of Fisheries, but his expenses while engaged in national park work will be paid by the National Park Service.

The work of this expert, so far as it relates to the national parks, consists of general supervision of fish-cultural studies and operations, including detailed studies of park waters to determine suitability for fish, a study of native or related fish species suitable for stocking or restocking, and the preparation of permanent management plans for all park waters. Studies will be made of the life history of native species and the desirability of their propagation and of the abundance or lack of fish food in waters considered for stocking.

The fish culturist spent the greater part of last summer in Yellowstone National Park, where a new fish hatchery station has just been completed. This structure was commenced last summer through the generosity of W. E. Corey, of New York, in donating \$15,000 for the work, and the cooperation of the Bureau of Fisheries in meeting his gift with an equal allotment of funds. The hatchery has a capacity of 30,000,000 eggs. An aquarium is being built in connection with it. Plants of fish fry, eyed eggs, and fingerlings amounting to 7,304,900 were made in Yellowstone waters.

Fish propagation in Glacier National Park, which was also visited by the fish culturist, received a new impetus during 1929 with the installation of fish racks and traps on creeks on the west side of the park, from which spawn was taken for the Federal hatchery at Glacier Park Station. Eight rearing ponds were also constructed for use in conjunction with the Glacier Park hatchery, through cooperation furnished park authorities by the Bureau of Fisheries and the Glacier Park Hotel Co. By rearing the fry to fingerling size in these ponds the survival to maturity of a large percentage of the plant is assured. During the year there were more than 2,000,000 fish planted in the waters of this park, and

21,000 fry were furnished to the adjacent Lewis and Clark National Forest for planting.

The Bureau of Fisheries also cooperated in furnishing eggs from Yellowstone National Park for planting in Mount Rainier National Park, and hatchery facilities were furnished by the Pierce County Game Commission.

The California State Fish and Game Commission continued to operate the hatchery in Yosemite Valley. An increase in fish planting is necessary in the streams and lakes of this park to provide adequate sport for the great numbers of visitors. The State commission also furnished fish plants for Sequoia and Lassen Volcanic National Parks.

The Grand Canyon offers an interesting desert oasis for fishing. Bright Angel Creek, on the north side of the canyon, was stocked several years ago, and during the past season fishing there was excellent, trout being found all the way down to the mouth of the stream. As a result the limit of catch was raised from 5 to 10.

The Estes Park hatchery outside of Rocky Mountain National Park, operated by the State of Colorado, is the chief source of supply of fish for the park lakes and streams. This hatchery has been completely rebuilt within the past year and is now one of the most up-to-date in the country.

SANITATION IN THE PARKS

The National Park Service has before it no more serious obligation to the public than that of protecting the health of visitors to the various parks and monuments. In order that the best advice on the subject might be available, the Public Health Service of the Treasury Department several years ago was asked to assist the Park Service in this matter. The whole-hearted response of that bureau in detailing one of its ablest sanitary engineers to devote his entire time to matters of national-park sanitation has resulted in excellent service to the public. An assistant surgeon of the Public Health Service has also been assigned to Yellowstone National Park to assist in safe-guarding the health of employees and visitors.

Sanitary inspections of the various parks were made during the year, with especial reference to the public camp grounds. Designs and plans were drawn up for sanitation development in the Yakima Park section of Mount Rainier National Park and also for the improvement of the sanitary arrangements of the older camps.

The activated sludge plant on the south rim of the Grand Canyon continued to function to a high degree and to attract the attention of sanitary engineers throughout the country. Continuous analyses, both chemical and bacteriological, are made of the treated effluent at this disposal plant, and tests are also made on the raw sewage and on samples taken from tanks during various stages of treatment. The operator in charge of the treating plant also conducts frequent tests on various drinking water supplies. The reclaimed water from this plant is used only for nondomestic purposes. The sewage disposal system on the north rim, constructed by the Union Pacific System in connection with the hotel development, also proved to be highly effective during the year.

In Yosemite National Park, where nearly half a million people congregate in the course of a year, weekly analyses were made of samples of the Yosemite Valley water supply and demonstrated its uniform potability. Tests were also made of Merced River water. Surveys were made for sewer system extensions and for removal of the disposal plants to new sites several miles down the valley.

Mosquito control work was carried on in several of the national parks, notably Yellowstone, Yosemite, and Rocky Mountain. At Grand Lake Lodge, in the latter park, the citizens of the village cooperated by bearing half the cost of the control work, since part of the area necessary for treatment in order to control the mosquito evil is outside of park boundaries. In the Yellowstone 700 gallons of oil were sprayed upon swamps and pools adjacent to the public automobile camps.

At Hot Springs National Park special sanitary precautions were taken in connection with the free public bathhouse and clinic. Inspections of these institutions and of other bathhouses permitted to use the hot waters were made during the year. Bathhouse employees coming in personal contact with bathers were examined monthly. The park administration assisted the city of Hot Springs in the physical examination and vaccination of all persons engaged in handling foodstuffs in the city.

WINTER USE OF THE NATIONAL PARKS

Winter travel to the national parks has shown a decided increase during the past few years and has brought with it many varied problems of park administration. Road building and general construction have been especially affected by the wintertime use of the parks. For instance, roads built for traffic use during the dry summer must now be improved by hard surfacing to enable them to withstand the ravages of heavy traffic after severe storms. Water lines that formerly were drained before freezing weather set in must now be improved to carry a steady supply during periods of low temperature; sewer lines must be kept from freezing; disposal systems must function; camp grounds must be planned with reference to the possibility of their being used throughout the year; and telephone lines, for which previously there had been no need during the winter, must now be in condition for regular and emergency duty. Buildings also must be constructed with the idea of being practicable for winter use. All this has placed added responsibilities on every line of park endeavor.

Twelve of the national parks and several of the national monuments of the Southwest were accessible to the public during the winter of 1928-29. Hawaii, Grand Canyon, Hot Springs, and Platt National Parks serve as interesting winter resorts of mild temperature. Yosemite Valley, in Yosemite National Park, has become increasingly popular during the past three seasons, with the completion of the all-year highway, which makes it accessible by motor throughout the year from coast and valley towns. Conditions here are ideal for winter sports, as the weather is seldom severe and snow conditions are usually excellent. Skiing, tobogganing, skating, snowshoeing, and sleighing are among the popular modes of winter recreation. While long-distance skiing is limited in Yosemite

Valley itself, in near-by parts of the park, particularly on the Wawona Road and up at Glacier Point, 3,000 feet above the valley, the visitor may indulge in skiing that cannot be equalled anywhere in the country. An innovation last winter was the keeping open of the Mountain House at Glacier Park, visitors being taken to it up the 4-mile trail by special Swiss guides.

Winter travel to Sequoia and General Grant National Parks is also increasing by leaps and bounds as roads are improved. The roads into Giant Forest, in the heart of the big trees, are kept open by the use of tractors immediately after each snowfall. Winter use of Mount Rainier National Park continued heavy. There was a falling off of travel during January, however, because of the fact that an unusually long stretch of cold weather and heavy snows throughout the Puget Sound country made it possible for the local people to get their winter sports at home instead of going into the park for them. Usually the park is the winter-sport mecca of the Puget Sound region.

The Colorado Mountain Club held its annual winter outing at Fern Lodge in Rocky Mountain National Park last February, and found snow conditions excellent. About 50 members of the club attended the outing.

Again last winter Crater Lake Park was the objective of the ski race held in connection with the annual winter carnival held at Fort Klamath. The total distance from Klamath to the rim of the lake and back, more than 40 miles, was made in less than six hours.

Although no regular winter lodge accommodations were provided in Zion National Park during the winter, meals were served to motorists desiring them at the Union Pacific construction camp. Winter travel to this park is expected to grow rapidly in the future.

The Casa Grande and Tumacacori National Monuments, in southern Arizona, experience their heaviest travel during the winter months.

Acadia and Wind Cave Parks, although offering no special winter inducements, may be visited throughout the year.

SERVICE BY THE PUBLIC UTILITY OPERATORS

The constant growth in travel to the national parks has made necessary the expansion of facilities for the accommodation of visitors. The operators of the various public utilities have endeavored to meet this need through the enlargement of hotel, lodge, and store accommodations, and the expansion of transportation facilities. Especially interesting has been the growth in popularity of the housekeeping cabins and cafeterias established by the operators in connection with the public camp grounds. I believe the public appreciates the services rendered along this line, for complaints are few. It is recognized, of course, that there is still room for improvement along some lines of public-utility service, but we are working steadily toward the elimination of all unsatisfactory service, and the operators show a praiseworthy spirit of willingness and cooperation.

THE AIRPLANE PROBLEM

The newest transportation problem in the national parks is presented by the airplane. Up to the present time the National Park Service has not permitted the construction of permanent landing fields within park areas, upon the grounds that airplane transportation was still in its experimental stage, and that until more safeguards were assured the public in this mode of travel the service could not sanction it.

There is no doubt, however, but that the airplane, probably in the near future, will become an accepted means of transportation to various parks, if not within them. Realizing that when this happens it will be necessary to provide facilities for airplane transportation, and make regulations concerning its operations within park boundaries, former Secretary West on February 20, 1928, called a conference of interested parties, at which the entire question was discussed. Attending this meeting, in addition to the department and service officials, were representatives of the various western railroads, park operators, representatives of the aviation interests, and others interested in the subject generally, either from the point of view of aviation or of preservation of the national parks in their natural condition.

No definite decision was reached at the conference, but at its close Secretary West appointed a committee to give further study to the matter. The committee consists of Representative L. C. Cramton, the Secretary of the Interior, and the Director of the National Park Service, with such additions as the committee itself may wish to make.

AIRPLANES AT THE GRAND CANYON

Two years ago sightseeing trips by airplane over the Grand Canyon were inaugurated. Upon the refusal of the National Park Service to permit the construction of a landing field upon park lands, permits were obtained for the location of an airport in the Tusayan National Forest, 18 miles south of park headquarters and entirely outside the park.

This service, somewhat experimental in character, has become very popular with visitors, trips across the canyon being made daily. Late this season, with the installation of Wasp motors in the big trimotored planes, sufficient lifting power was obtained to enable the planes to take off at the high elevation of V. T. Park, on the north rim, and a regular trans-canyon service was instituted.

In order to determine to what extent airplane facilities are of service to the park visitor, an arrangement was made by the National Park Service and the utility operators whereby the airplane company was permitted to maintain an office in connection with the transportation department of the operator, and motorbus service between the park hotel and the airport was established. Judging from the public approval with which this new service has met, its future seems assured. Undoubtedly the question of officially recognizing airplanes at this park, at least, will be given more consideration. Meantime in its dealings with park authorities the airplane company has cooperated in every way possible and displayed a willingness to work in a fair-minded way toward the final solution of the entire problem.

ELEVENTH NATIONAL PARK CONFERENCE

The Eleventh National Park Conference was held in Yellowstone National Park, Wyo., from September 18 to 27, 1929. It was attended by the superintendents of all the major national parks, the general field engineering, landscape, and educational officers, and other field officers. The Washington office was represented by the Director and the Associate Director. Officials of cooperative bureaus and other agencies were also invited to attend. The first four days were spent in studying the operations of Yellowstone Park and visiting the newly-established Grand Teton National Park to the south. The business sessions, which lasted another four days, were held at park headquarters at Mammoth Hot Springs, with two more days devoted to conferring with various officials on their individual problems. Special attention was devoted to road and trail problems, educational activities, landscape protection, fire control, patented land problems, and matters of public contact.

After each of these service conferences I am more and more impressed with the important part they fill in bringing about personal contact between the various field representatives, and between them and officials from both field and Washington headquarters. The cost is more than justified by the results obtained.

APPROPRIATIONS AND REVENUES

The total appropriations to the National Park Service for the fiscal year 1929 were \$4,754,015, with additional authority to enter into contractual obligations for road work up to \$4,000,000. This includes \$17,500 contained in the second deficiency act of 1928, approved May 29, 1928, and \$94,315 contained in the second deficiency act of 1929, approved March 4, 1929. Cash donations to the national parks received for the fiscal year ended June 30, 1929, amounted to \$16,255.10. These funds were deposited in the United States Treasury and expended under the same fiscal regulations governing expenditures of Federal funds.

Revenues derived from the operation of national parks during the fiscal year 1929 amounted to \$849,272.95, an increase of \$41,017.14 over the 1928 revenues and an increase of \$22,818.78 over the record 1926 revenues. At the end of the 1926 year sharp reductions were made in the fees for automobile licenses that motorists are required to secure in the various parks. With the notable improvements in the park road systems made possible by the \$5,000,000 annual authorization for road construction the revenues should continue to increase substantially.

PARK ROAD DEVELOPMENT

With the approval of base plans for the continued development of adequate road and trail systems in the national parks on modern standards calling for an ultimate expenditure of \$51,000,000, annual authorization for park road construction was increased by Congress from \$2,500,000 to \$5,000,000 in the 1929 Interior Department appropriation act. Of the \$2,500,000 in cash appropriated by this act, however, \$1,500,000 was taken up by contractual authorizations made under the authority of the 1928 act, leaving only \$1,000,000 of free cash to apply to the 1928 construction season program. In

addition the 1929 act authorized the Secretary of the Interior to incur obligations and enter into contracts for additional road-construction work not exceeding a total of \$4,000,000. Under this cash appropriation and authorization the 1928 construction season program provided for \$5,000,000 worth of work. The 1928 construction season from the standpoint of weather conditions was excellent and contractors on major road projects were enabled to earn more cash than was available in the Treasury. As the result of these conditions cash was exhausted prior to the end of the construction season, and all contracts had to be shut down except where contractors were able to continue by financing themselves until the 1930 appropriation became available. This worked considerable hardship on many of the contractors and valuable time was lost in road building.

The 1930 Interior Department appropriation act became law March 4, 1929. Of the \$5,000,000 cash appropriated, \$4,000,000 was covered by contractual obligations authorized by the 1929 act. Outstanding payments due contractors were made promptly after March 4 and work resumed under going contracts.

In order to avoid a similar deficiency in cash at the end of the 1929 construction season the amount of authorization in the 1930 act was limited to \$2,500,000, so that the current construction program was reduced to a basis of \$3,500,000, with only \$1,000,000 in cash available. A number of projects programmed for the current construction season had to be deferred for advertising and letting until late this season so that contractors would not earn more than available cash.

For 1931 it is expected that the roads and trails appropriation will be continued on the \$5,000,000 cash basis with authorizations totaling \$2,500,000. As one-half of the 1931 cash will have been obligated by the 1930 appropriation, the forthcoming construction season program will provide \$2,500,000 in cash and \$2,500,000 in authorization. Experience has proved that due to the high elevation in the parks road projects can not be completed within one construction season but are extended over at least two construction years. At least cash equal to one-half of the total authorization is necessary in order to efficiently carry on the park programs.

Under the stimulus of the enlarged park road program the betterment of park approach roads has gone forward steadily under State and Federal aid.

SERVICE WRONGLY CLASSIFIED

Of the conservation bureaus of the Federal Government, the National Park Service alone, under decision of the Personnel Classification Board, remains as a "major bureau" instead of one of "the largest and most important" bureaus of the department in which it is placed. From the standpoint of appropriations, revenues, service to the public, and constructive work in conservation, the National Park Service is second to no other conservation bureau of the Federal Government. Furthermore, in our own department the National Park Service is the only one of the seven bureaus not classified as one of the most important, although its appropriations exceed those of the majority of the other bureaus, and its volume of work and responsibilities increase tremendously each succeeding year.

Not only do I personally feel this discrimination against the National Park Service, but this feeling is general with officers and employees who are adversely affected by the board's ruling, particularly as we are brought in constant contact with the personnel of the other conservation bureaus and thus made to feel more keenly this discrimination.

I sincerely hope that at an early date the Personnel Classification Board will properly classify the service as one of the largest and most important bureaus of the Department of the Interior in accordance with the facts.

NATIONAL CAPITAL PARK AND PLANNING COMMISSION

Under its organic act the Director of the National Park Service is a member of the National Capital Park and Planning Commission, established in 1924 under the name of the National Capital Park Commission for the purpose of extension of the park and playground system of Washington and its environs, and the preservation and protection of its natural attractions, forests, valleys, rivers and open streams, waterfalls, military fortifications, and historic homes. Under further legislation changing the name of the commission its functions were enlarged to include highway extension, location and type of public buildings, and all features of city planning. During the year the commission met monthly, its meetings consuming from two to five days' time. Particular attention was given to the developing of a fort drive, connecting the Civil War forts, and during the last two or three months considerable property has been acquired for this purpose. Perhaps the biggest single accomplishment of the year was the acquiring of the Patterson tract, which contains 42½ acres of forest land.

The Associate Director of the National Park Service is a member of the coordinating committee of the National Capital Park and Planning Commission, together with representatives of every activity of the Federal Government concerned with District parks, highways, and public buildings, and as Acting Director he also attends, with power of vote, regular meetings of the commission during the absence of the director in the field.

INTERBUREAU AND STATE COOPERATION

The long-established policy of the National Park Service of availing itself whenever possible of the scientific and technical resources of other Government bureaus in solving special problems was continued during the past year. Because of the splendid cooperation of all bureaus approached in helping this service solve its many technical and scientific problems, it has been possible to obviate the need for building up within the bureau corps of specialists in many different lines. This course, it is believed, has resulted in securing for the national parks the best advice obtainable, and at the same time has been economical from the standpoint of expenditure of Government funds. It was continued to the fullest extent during the year just closed.

The work of the Bureau of Public Roads of the Department of Agriculture in handling the major road construction projects in the national parks, and the cooperation of the Public Health Service of the Treasury Department in handling park sanitary problems

have been discussed elsewhere, as has the cooperation extended by the Bureau of Fisheries of the Department of Commerce. The Weather Bureau, the Bureau of Biological Survey, and the Bureau of Animal Industry, all of the Department of Agriculture, have cooperated to the fullest extent in solving park problems, and the Forest Service of the same department and the Park Service have worked together on forest fires and other mutual problems.

The Post Office Department has rendered excellent service direct to park visitors, and the Department of Justice has maintained a commissioner's court in several of the parks, which greatly simplified the administration of justice. The General Accounting Office of the Treasury Department continued to assist in installing and perfecting the uniform accounting system in the field, and the Alaska Road Commission has constructed roads for the service in Mount McKinley National Park and also cooperated in the work at the Sitka National Monument.

The Geological Survey of this department has also cooperated fully, through its volcanological work in Hawaii and Lassen Volcanic Parks and also in making topographic maps of parks and proposed park areas. The principal map under preparation this year was the topographic sheet of Zion National Park.

The cooperation of the States in which the national parks and monuments are located is also greatly appreciated. State fish and game commissions have been especially helpful in furnishing fish for stocking park waters in areas where there is no Federal hatchery.

ROCKY MOUNTAIN PARK UNDER FEDERAL JURISDICTION

Through the cooperation of the State of Colorado, jurisdiction over the Rocky Mountain National Park was ceded to the Federal Government last February and accepted by Congress the following month. Development of the park, which had been retarded pending the settlement of the jurisdiction problem, is now being pushed.

DONATIONS

The practical public cooperation in aiding the national park and monument system through gifts of land, money, and equipment, that has meant so much to the National Park Service in the past, was continued during 1928-29 by public-spirited individuals and corporations. Gifts of land and of money to purchase private holdings in the parks, as explained elsewhere, probably took first rank among last year's donations. Other gifts included museum and library equipment material, a complete museum and the site on which it stands, and funds for roadside cleanup, snow removal, and other important purposes. Owing to limited space it is impracticable to list in detail all the gifts and their donors.

On behalf of the National Park Service, and of the visiting public generally, I wish publicly to express my sincere appreciation to all contributors to the welfare and progress of the national parks. Their generosity benefits not only the users of the parks today, but also our citizens of the future, for whom the parks are being preserved. And by their generosity and their interest in the national park and monument system, these benefactors are a source of inspiration to the officers and employees of the service as well as to Congress.

FOREIGN PARK DEVELOPMENTS

Recognition of the important part the national parks of the United States play in the life of the Nation has been increasingly accorded by foreign peoples. The Yellowstone, created in 1872, was not only the first established in this country, but also in the world. Even Americans were slow to follow up this precedent and create more parks, and such as were established during the closing years of the nineteenth century and the first 10 years of the succeeding one did not attract much attention, either at home or abroad. However, since our own national park and monument system has expanded so remarkably, foreign peoples have come to recognize the economic and esthetic value of such reservations, and during the last half dozen years many requests have been received from foreign conservationists for information as to the methods of establishment and administration of the national parks of the United States. For this reason the interest of the service officials in foreign park development is keen.

Within the past year considerable information regarding the establishment of foreign parks has come to our attention, either through direct requests for advice as to the best method of procedure, or through the cooperation of United States consuls abroad in sending to us data on the subject that comes to their attention. One especially interesting project is that being pushed by conservationists of Greece to make Mount Olympus, mythical home of the gods, a national park. This mountain and the surrounding region is wild and largely uninhabited, somewhat comparable to the region of the proposed Great Smoky Mountains National Park.

The Albert National Park, in the Belgian Congo, is the direct result of the interest taken by the King of the Belgians in our national parks, several of which he has visited. The area of this park, first set aside in 1925 in accordance with the suggestions of the late Carl Akeley, was greatly enlarged by royal decree during the summer. It is understood that the new park will be administered by a scientific board composed of 21 members, seven of whom are to be selected from among foreign scientists. An European game warden and staff of native scouts have been appointed to enforce the regulations and protect the great variety of wild animals.

Word of a movement to establish a national park in the Malay Peninsula has just come to the service from the game warden at Pahang, in the Federated Malay States. The area under consideration is about a million acres in extent and is uninhabited except by a primitive wild race whom one rarely sees. The prime motive behind this park movement is to provide a sanctuary for game animals that otherwise face extermination.

A special study of our national parks was made on the ground during the past season by a representative of the Government of the Union of South Africa, as that Government felt the experience of the United States in the management and control of its parks would be of great value and assistance in connection with the administration and development of similar African reservations.

Coming nearer home, material regarding our own national parks has been furnished by request to people in Scotland, who are interested in creating a national park to preserve a portion of the Scottish Highlands in its primitive condition. According to recent reports,

this movement is making considerable headway. If created, this Scottish reservation will probably be called a national forest reserve, as according to Scottish custom the word "forest" is applied to a tract of hill country even if practically treeless, while "park" to the Scots conveys the idea of more circumscribed pleasure grounds, such as our city parks.

The Americans of two continents also have park projects under way. A new national park in the Mount Tremblant district of the Laurentian Mountains of Canada is to be opened to the public in 1930, according to present plans. The land for this reserve was set aside by the Province of Quebec several years ago and the Quebec Fish and Game Protection Association recently has been making the necessary arrangements with the Dominion Government for the opening of the park. In it are lakes that have never been fished and arrangements have been made between the Fish and Game Association and the provincial government to provide instruction in the schools throughout the province with regard to fish and game conservation. I am informed that the plan of administration involves the payment of rather nominal entrance fees by all visitors, regardless of the length of their sojourns in the park.

The scenic Kaieteur Fall in British Guiana also may be preserved as a national park, under a bill which has recently been drawn up for introduction at the next meeting of the legislative council and which will be known as the Kaieteur National Park Ordinance, 1929. This fall, located on the Potaro River, plunges with a sheer descent of 741 feet over a hard ledge of rock 370 feet wide, whose underlying softer layers have been worn back into an enormous black cavern. The surrounding scenery is described as most picturesque.

Reports from Japan indicate that the national-park movement of that country received great impetus through the visit of experts to this country several years ago, and through the participation of a number of Japanese delegates in the Pan-Pacific Conference on Education, Rehabilitation, Reclamation, and Recreation, held in Hawaii in April, 1927. Just recently word comes of a novel means of popularizing the national-park idea through the display in Tokio's leading department store of exhibits featuring proposed national parks.

LEGISLATION

The following is a summary of legislation affecting the national parks considered in Congress since the preparation of the twelfth annual report.

BILLS ENACTED INTO LAW

The second deficiency act of March 4, 1929 (Public No. 1035), carried the following appropriations for the National Park Service:

Crater Lake National Park, insect-control work by transfer from appropriations for the fiscal year 1929 for Mesa Verde, Rocky Mountain, and Yellowstone National Parks.....	\$9, 000
Mount Rainier National Park, sewage-disposal system in Paradise Valley.....	2, 500
Yosemite National Park, electrical energy for the fiscal year 1929.....	5, 000
Emergency reconstruction and fighting forest fires, including replacement of equipment destroyed by fire in Glacier National Park.....	29, 000
Supplemental appropriations to carry out the provisions of the Welch Act	60, 315

In addition to the above, the second deficiency act made appropriations for Yellowstone National Park available for the Yellowstone National Park Boundary Commission, authorized the sale or disposal otherwise of surplus elk from Yellowstone, and carried an appropriation of \$60,000 for the Geological Survey to complete a topographic survey of the boundaries of the proposed Great Smoky Mountains National Park.

The Department of the Interior appropriation act for the fiscal year 1930, approved March 4, 1929 (Public No. 1033), carried appropriations of \$7,627,940 for the National Park Service in Washington and for the administration, protection, maintenance, and improvement of the various national parks and monuments, as well as the construction of roads and trails therein. Included in this sum is a reappropriation of the unexpended balances of appropriations for preliminary expenses incident to the proposed Shenandoah, Great Smoky Mountains, and Mammoth Cave National Parks, and an appropriation of \$250,000, available when matched dollar for dollar by money from private sources, for the acquisition by condemnation proceedings or otherwise of privately-owned lands within the boundaries of national parks, except summer homes in Acadia, Glacier, Grand Canyon, Great Smoky Mountains, Hot Springs, Platt, and Yellowstone. The act also carried authority for the Secretary of the Interior to incur obligations for the acquisition of such privately-owned lands to the amount of \$2,750,000 and the entering into of contracts in the amount of \$2,500,000 for roads and trails work. The 1930 appropriation act also made available \$75,000 for the acquisition of lands to be added to the Absaroka and Gallatin National Forests to improve winter feed facilities for elk from Yellowstone National Park. This sum, before it could be used, had to be matched by money from private sources, but the private funds were available as soon as this appropriation from the Treasury.

H. R. 4589, to reimburse Dan A. Morrison for expenses incurred in developing the Lewis and Clark Cavern National Monument was approved February 4, 1929. (Private No. 354.)

H. R. 11285, which authorized the establishment of Federal prison camps and the use of Federal prisoners on road and trail work was approved February 26, 1929. (Public No. 822.) This act will permit the use of such labor on road and trail projects in national parks, if it is deemed advisable to employ convicts in these areas. There are some serious problems to dispose of before this should be done.

H. R. 11406, authorizing the Secretary of the Interior to exchange lands outside of Lassen Volcanic National Park for privately-owned lands therein was approved March 1, 1929. (Public No. 896.)

H. R. 11719, which was approved January 19, 1929 (Public No. 665), changed the boundaries of Lassen Volcanic National Park so as to include therein certain scenic areas of lava beds, mountains, and lakes that were inadvertently left out at the time the park was established. This added approximately 25,000 acres to the park.

H. R. 15088, changing the name of Lafayette National Park to Acadia National Park and authorizing the acceptance of donations of lands to be added thereto was approved January 19, 1929. (Public No. 667.)

H. R. 17101, by which the United States accepted the cession by the State of Colorado of exclusive jurisdiction over Rocky Mountain National Park was approved March 2, 1929. (Public No. 1009.)

S. J. Res. 206, authorizing the appointment of a commission to study the proposed adjustment of the southeast, south, and southwest boundaries of Yellowstone National Park, was approved February 28, 1929. (Public Resolution 94.) The purpose of this boundary adjustment is to make it conform to natural physical conditions rather than arbitrary lines.

S. Res. 237, of the Seventieth Congress, authorized the Committee on Public Lands and Surveys to visit sites of proposed national parks and to study proposed revisions of boundaries of existing parks. On March 2, 1929, the committee submitted its report, recommending the establishment of the Roosevelt and Grand Teton National Parks and the Bad Lands National Monument. The Grand Teton National Park was established and the Bad Lands National Monument authorized to be established under certain conditions by the Seventieth Congress. The committee also commended the manner in which the Park Service was being conducted, and stated that it is becoming apparent that additional national parks are needed.

S. Res. 316, agreed to on February 26, 1929, authorizes the Committee on Public Lands and Surveys to study the advisability of establishing additional national parks.

S. 3001, providing for additions to the northwest, northeast, and east boundaries of Yellowstone National Park was approved March 1, 1929. (Public No. 888.) The additions include the drainage area of certain streams emptying into the Gallatin River, the drainage area of Pebble Creek, and make the crest of the Absaroka Range a natural boundary line.

S. 4385, approved March 4, 1929 (Public No. 1021), authorizes the establishment of the Bad Lands National Monument, in the State of South Dakota, when the necessary lands have been donated to the Government, provided the State builds a road, satisfactory to the Secretary of the Interior, from Interior, S. Dak., to the monument area.

S. 4704 authorizes the investigation of advisability and practicability of establishing the Everglades National Park, Florida. Approved March 1, 1929. (Public No. 897.)

S. 5543, approved February 26, 1929 (Public No. 817), established the Grand Teton National Park, Wyo. This bill provides that no new roads or permanent hotels or camps shall be constructed in the park without the consent of Congress. The intent of the bill is to keep the undeveloped part of the area a wilderness.

S. 5880, approved March 2, 1929 (Public No. 924), authorized the President to add approximately 9,000 acres of contiguous national forest land to the western boundary of Yosemite National Park upon joint recommendation of the Secretaries of the Interior and Agriculture.

OTHER MEASURES INTRODUCED OR PARTIALLY ACTED UPON DURING THE SECOND SESSION OF THE SEVENTIETH CONGRESS WHICH FAILED OF PASSAGE OR DID NOT RECEIVE THE APPROVAL OF THE PRESIDENT

H. R. 5729 and S. 675, to establish the Ouachita National Park, in the State of Arkansas. The latter was passed by Congress but did not receive the approval of the President. This proposed park is opposed by the department, as it does not measure up to national-park standards.

H. R. 13624, to authorize the building of roads and making of improvements in Craters of the Moon National Monument, and authorizing an appropriation of \$35,000 for this purpose. The department's report on this bill says there is already authority to build the road.

H. R. 13694, to authorize the striking of a medal commemorative of the enactment of legislation providing for the establishment of Mammoth Cave National Park.

H. R. 15199, for the relief of the Yosemite Lumber Co. in the amount of \$2,114.74 for money spent in fighting forest fires in Yosemite National Park.

H. R. 15475, providing for the establishment of Grand Teton National Park and revising the boundaries of Yellowstone National Park. This bill provided that no new roads or trails, hotels, or permanent camps should be constructed in the proposed park or in the area proposed to be added to Yellowstone. The Grand Teton Park was created by a separate act.

H. R. 15713, to provide for uniform contracts.

H. R. 16352, providing that no lands owned by any religious organization within national parks, when used exclusively for religious purposes, may be purchased or acquired by the Government.

H. R. 16652, to authorize the Secretary of War to enlarge the Army and Navy General Hospital at Hot Springs, Ark.

H. R. 16715, to extend the eastern boundaries of the Great Smoky Mountains National Park.

H. R. 17219, to grant the consent of the United States for the taxation, by the State of Wyoming, of all structures and other property in private ownership in Yellowstone National Park.

H. R. 17277, to authorize the Secretary of the Interior to investigate and report on the advisability and practicability of establishing a national park in the Okefenokee Swamp, Ga.

S. 2571, to change the boundaries of Yellowstone National Park by taking in headwaters of the Yellowstone River.

S. 3874, authorizing an appropriation of funds for construction of a highway from Red Lodge, Mont., to the boundaries of Yellowstone National Park near Cooke City, Mont.

S. 4172, to establish the Kildeer Mountain National Park in the State of North Dakota. The department's report says this area is not of national-park caliber.

S. 4171, to establish the Roosevelt National Park, N. Dak.

S. 4173, to transfer jurisdiction over certain national military parks and monuments from the War Department to the Department of the Interior.

S. 4674, to establish the Grand Teton National Park and to revise the boundaries of Yellowstone National Park.

S. 5896, to provide for uniform administration of national parks.

S. 5897 provides that no permits, etc., shall be issued for prospecting the mineral resources of Mesa Verde National Park; no more mining claims to be granted in Mount McKinley; no more permits to be issued for summer homes in Glacier or Lassen, except those now outstanding may be renewed; no more rights of way for railroads or roads in Lassen to be issued; that acquisition of rights of way through the valley of the Flathead River for railroads in Glacier Park is prohibited; and repealing authorization for the granting of rights of way in Mount Rainier and Rocky Mountain National Parks.

S. 5900, to abolish the Papago Saguaro National Monument and dispose of the lands therein to the town of Tempe, Ariz., for park and recreational purposes.

*BILLS INTRODUCED IN THE FIRST SESSION OF THE SEVENTY-FIRST CONGRESS
AND STILL PENDING*

H. R. 151, authorizing an appropriation of \$1,943,200 for construction of a highway from Red Lodge, Mont., to the boundaries of the Yellowstone National Park near Cooke City, Mont.

H. R. 235, to establish the Roosevelt National Park along the Little Missouri River, N. Dak.

H. R. 239, to establish the Kildeer Mountain National Park, in the State of North Dakota.

H. R. 717 and S. 1143, to enlarge the Army and Navy General Hospital at Hot Springs National Park, Ark.

H. R. 2374, to add 4,080 acres to the Sequoia National Park. This bill extends the mineral land laws to the added area.

H. R. 2940, to provide for extension of the eastern boundary limits of the proposed Great Smoky Mountains National Park.

H. R. 3568, to remove the proviso carried in Public No. 888, Seventieth Congress, revising the boundaries of Yellowstone National Park, prohibiting the building of roads and hotels in the added area.

H. R. 3572, to establish the Homestead National Park on the Daniel Freeman homestead in Nebraska. The purpose of this act is to develop a memorial to the homestead law.

H. R. 3590, to establish a national park in Texas.

H. R. 3658, to establish Fort Boonesboro National Monument, Kentucky, as a memorial to the pioneer settlers of the West.

H. R. 3867 and S. 1494, to establish the Ouachita National Park.

H. R. 4020, authorizing investigation of advisability and practicability of Upper Mississippi National Park in Iowa.

H. R. 4021, to accept the grant by the State of Montana of concurrent police jurisdiction over the rights of way of the Blackfeet Highway, and over the rights of way of its connections with the Glacier National Park road system on the Blackfeet Indian Reservation.

S. 121, to amend the Federal aid highway law. This bill provides for the survey, construction, reconstruction, and maintenance

nance of main roads through unappropriated or unreserved public lands, nontaxable Indian lands, or other Federal reservations other than forest reservations without contribution from the States, and authorizes the Secretary of Agriculture to cooperate with the Secretary of the Interior in the improvement and maintenance of roads through said lands. It is not believed that the parks will be eligible for allocation of funds from appropriations made under this bill, as the highway act provides that highways in national parks shall not be taken over by the Secretary of Agriculture.

S. 195, to facilitate administration of national parks.

S. 196, to facilitate the administration of the National Park Service by authorizing purchase of supplies and equipment for employees and making deductions from their salaries; payment of mileage to employees for use of their own automobiles on official business when expenses can be reduced thereby; in emergencies to sell supplies to operators; permitting acceptance of travelers' checks, authorizing central warehouse and purchase of supplies to be charged to projects under specific appropriations; care of indigents in national parks; reimburse employees for loss of property destroyed while in use on official business; that employees may be required to furnish transportation and equipment necessary for their work, but that the Government may provide fuel, forage, etc.; and that the Government may purchase, hire, or rent property from employees.

S. 326, to establish the Royal Gorge National Park, Colo. This bill repeals an act ceding the lands to be included in this park to the city of Canon City, Colo.

S. 428, to transfer the former naval radio station, Seawall, Me., to the Acadia National Park.

S. 940, to create a department of conservation.

S. 1183, to authorize the conveyance of a tract of land in Hot Springs National Park to P. F. Connelly Paving Co.

PRESIDENTIAL PROCLAMATIONS

On April 12, 1929, the President issued a proclamation establishing the Arches National Monument, Utah, comprising 4,520 acres. This monument contains extraordinary examples of wind erosion in the shape of gigantic arches, natural bridges, windows, spires, balanced rocks, and other unique wind-worn sandstone formations.

EXECUTIVE ORDERS

May 3, 1929, No. 5105, withdrawing from entry 9 square miles of land in Nevada pending determination as to the advisability of establishing a national monument. This area includes the Forty-mile Canyon Pueblo.

January 28, 1929, No. 5037, withdrawing from entry 5,080 acres pending determination as to the advisability of adding to Zion National Park.

February 2, 1929, No. 5038, withdrawing from entry 13,680 acres pending determination as to the advisability of including in the Pinnacles National Monument.

February 4, 1929, Supplemental Executive Order No. 5040, withdrawing from entry, location, or sale, but subject to prior claims

legally initiated and maintained, certain lands in the Jackson Hole country for elk refuge purposes.

August 29, 1929, No. 5182, lands in the Owens River Valley, Calif. and Nev., were withdrawn pending classification, subject to existing withdrawals affecting certain of the lands. These lands contain Indian petroglyphs and ruins.

INDIVIDUAL PARK REPORTS IN APPENDIX C

In the foregoing report the outstanding phases of national park administration have been touched upon. Further details of field work are given in the individual reports from the various park superintendents, the superintendent of southwestern monuments, and the chiefs of the technical and special divisions, and are printed in Appendix C.

The acting superintendent of Sullys Hill National Park, whose report is included in Appendix C, is superintendent of the Fort Totten Indian School and serves as acting superintendent of the park through the courtesy of the Indian Service without cost to the National Park Service. No appropriations for the administration of the park have ever been made through the National Park Service, all funds for its improvement having been expended by the Bureau of Biological Survey, as the park is in a game preserve administered by that bureau. For this reason its designation as a park is a misnomer, and I hope its status may be changed from that of a national park to a game preserve.

CONCLUSION

In concluding this thirteenth annual report of the National Park Service, I wish to express my keen appreciation to all who have assisted in promoting the successful development of the national park and monument system during the past year, and particularly since my incumbency of the office of Director.

The vacancy that my transfer to Washington left in the Yellowstone superintendency resulted in many transfers and promotions throughout the field service.

The officers of the department have been most helpful and sympathetic, members of the headquarters office have worked almost to the limit of physical endurance in their loyal support of park principles, and the field officers and employees continued their unwavering support of park policies without which the service would cease to function. It is a source of great pleasure and pride to me to be at the head of such a loyal, efficient, and result-producing organization.

I look to even greater opportunities in the future to render public service through the administration of the national park system. Three new national parks are in the process of making in the East, and when established they will serve the highly-concentrated population of the Eastern States. In the educational work which we have inaugurated we are just beginning to substantially develop the unique opportunities afforded the public for the study of the natural sciences, and through extension of visual education service will be enabled to bring the national parks to the people who may not have opportunity to visit them. With the continued development of the road

and trail systems and the public camp grounds for visitors, we fully have in mind the original purpose of the national parks to preserve as nearly as possible in their original condition the bits of native America for the benefit of future generations. All these ideals can and will be accomplished with the continued support of the public, the department, and the Congress.

Respectfully submitted.

HORACE M. ALBRIGHT, *Director.*

APPENDIX A

NATIONAL PARKS AND NATIONAL MONUMENTS ADMINISTERED BY VARIOUS FEDERAL DEPARTMENTS

NATIONAL PARKS TABLE 1.—*National parks administered by the National Park Service*

[Number, 21; total area, 12,118 square miles]

Name	Location	When established	Area in square miles	Distinctive characteristics
Acadia ¹ 1919	Maine coast...	{ Feb. 26, 1919 Jan. 19, 1929 ² }	16	{ The group of granite mountains upon Mount Desert Island and also bold point on opposite mainland across Frenchmans Bay—Formerly called the Lafayette National Park.
Bryce Canyon ¹ ... 1928	Southwestern Utah.	{ June 7, 1924 ³ Feb. 25, 1928 ² May 12, 1928 Sept. 15, 1928 }	23	{ Box canyon filled with countless array of fantastically eroded pinnacles—Best exhibit of vivid coloring of earth's materials.
Crater Lake ¹ 1902	Southwestern Oregon.	May 22, 1902	249	Lake of extraordinary blue in crater of extinct volcano—Sides 1,000 feet high—Interesting lava formations—Fine fishing.
General Grant ¹ ... 1890	Middle eastern California.	Oct. 1, 1890	4	Created to preserve the celebrated General Grant Tree, 40.3 feet in diameter—31 miles by trail from Sequoia National Park.
Glacier ¹ 1910	Northwestern Montana.	May 11, 1910	1,534	Rugged mountain region of unsurpassed alpine character—250 glacier-fed lakes of romantic beauty—60 small glaciers—Precipices thousands of feet deep—Almost sensational scenery of marked individuality—Fine trout fishing.
Grand Canyon ¹ ... 1919	North central Arizona.	{ Feb. 26, 1919 Feb. 25, 1927 ³ Mar. 7, 1928 ³ }	1,009	{ The greatest example of erosion and the most sublime spectacle in the world.
Grand Teton ¹ 1929	Northwestern Wyoming.	Feb. 25, 1929	150	Includes most spectacular portion of Teton Mountains, a granite uplift of unusual grandeur.
Hawaii ¹ 1916	Hawaii.....	{ Aug. 1, 1916 May 1, 1922 ³ Feb. 12, 1927 ³ Apr. 11, 1928 ³ }	245	{ Interesting volcanic areas—Kilauea and Mauna Loa, active volcanoes on the island of Hawaii; Haleakala, a huge extinct volcano on the island of Maui.
Hot Springs ¹ 1921	Middle Arkansas.	Mar. 4, 1921	1½	46 hot springs said to possess healing properties—Many hotels and boarding houses—19 bathhouses under Government supervision. Reserved by Congress in 1832 as the Hot Springs Reservation to prevent exploitation of hot waters.
Lassen Volcanic ¹ ... 1916	Northern California.	{ Aug. 9, 1916 Apr. 26, 1928 ² May 21, 1928 Jan. 19, 1929 ² }	163	{ Only active volcano in United States proper—Lassen Peak, 10,460 feet—Cinder cone 6,907 feet—Hot springs—Mud geysers.
Mesa Verde ¹ 1906	Southwestern Colorado.	{ June 29, 1906 June 30, 1913 ² }	80	{ Most notable and best preserved prehistoric cliff dwellings in United States, if not in the world.
Mount McKinley ¹ ... 1917	South central Alaska.	{ Feb. 26, 1917 Jan. 30, 1922 ³ }	2,645	{ Highest mountain in North America—Rises higher above surrounding country than any other mountain in the world.
Mount Rainier ¹ ... 1899	West central Washington.	{ Mar. 2, 1899 May 28, 1926 }	325	{ Largest accessible single peak glacier system; 28 glaciers, some of large size; 48 square miles of glacier, 50 to 500 feet thick—Wonderful subalpine wild-flower fields.
Platt..... 1902	Southern Oklahoma.	{ July 1, 1902 Apr. 21, 1904 June 29, 1906 Jan. 26, 1915 ² }	1½	{ Sulphur and other springs possessing medicinal value.
Rocky Mountain ¹ ... 1915	North middle Colorado.	{ Feb. 14, 1917 June 2, 1924 ² June 9, 1926 }	378	{ Heart of the Rockies—Snowy range, peaks 11,000 to 14,255 feet altitude—Remarkable records of glacial period.
Sequoia ¹ 1890	Middle eastern California.	{ Sept. 25, 1890 July 3, 1926 }	604	{ The Big Tree National Park—Scores of sequoias 20 to 30 feet in diameter, thousands over 10 feet in diameter, General Sherman Tree, 37.3 feet in diameter and 273.9 feet high—Towering mountain ranges—Startling precipices—Mount Whitney and Kern River country.

Footnotes at end of table.

NATIONAL PARKS TABLE 1.—*National parks administered by the National Park Service—Continued*

Name	Location	When established	Area in square miles	Distinctive characteristics
Sullys Hill..... 1904	North Dakota	Apr. 27, 1904	1½	Small park with woods, streams, and a lake—Is a wild-animal preserve.
Wind Cave ¹ 1903	South Dakota	Jan. 9, 1903	17	Cavern having several miles of galleries and numerous chambers containing peculiar formations.
Yellowstone ¹ 1872	{ Northwestern Wyoming, southwestern Montana, and northeastern Idaho. }	{ Mar. 1, 1872 Mar. 1, 1929 }	{ 3,426 }	{ More geysers than in all rest of world together—Boiling springs—Mud volcanoes—Petrified forests—Grand Canyon of the Yellowstone, remarkable for gorgeous coloring—Large lakes—Many large streams and waterfalls—Vast wilderness, one of the greatest wild bird and animal preserves in the world—Exceptional trout fishing.
Yosemite ¹ 1890	Middle eastern California.	{ Oct. 1, 1890 May 28, 1928 ² }	1,126	{ Valley of world-famed beauty—Lofty cliffs—Romantic vistas—Many waterfalls of extraordinary height—3 groves of Big Trees—High Sierra—Waterwheel Falls—Good trout fishing.
Zion ¹ 1919	Southwestern Utah.	Nov. 19, 1919	120	Magnificent gorge (Zion Canyon), depth from 1,500 to 2,500 feet, with precipitous walls—Of great beauty and scenic interest.

¹ General information circulars on these parks may be obtained free on application.² Boundary changed.³ Date acquisition private land as provided by act of June 7, 1924.⁴ In Wyoming, 3,145 square miles; in Montana, 245 square miles; in Idaho, 36 square miles.NATIONAL PARKS TABLE 2.—*National military and other parks administered by the War Department*

[Number 11, total area, 21 square miles or 14,062 acres]

Name	Location	When established	Area (acres)	Description
Antietam Battle Field.....	Maryland.....	Aug. 30, 1890	40	Scene of one of the greatest battles of the Civil War.
Chickamauga and Chattanooga.	Georgia and Tennessee.	Aug. 19, 1890	6,542	Beautiful natural park; embraces battle fields of Chickamauga and Missionary Ridge and scenes of other conflicts of the Civil War fought in the vicinity of Chattanooga during 1863.
Fredericksburg and Spotsylvania.	Virginia.....	Feb. 14, 1927	(¹)	Scene of Battles of Fredericksburg, Spotsylvania, Wilderness, Chancellorsville, and Salem Church at or near Fredericksburg.
Fort Donelson.....	Tennessee.....	Mar. 26, 1928	(¹)	Site of Civil War fort—now military cemetery.
Gettysburg ²	Pennsylvania.....	Feb. 11, 1895	2,317	Beautiful natural park; scene of Civil War combat; probably better marked than any other battle field in the world.
Guilford Courthouse.....	North Carolina.	Mar. 2, 1917	110	Near Greensboro; scene of one of the great battles of the Revolution; fought in 1781.
Moore's Creek.....	.....do.....	June 2, 1926	30	Scene of one of most memorable battles of Revolutionary War.
Petersburg.....	Virginia.....	July 3, 1926	185	Scene of campaign and siege and defense of Petersburg, Va., in 1864 and 1865.
Shiloh.....	Tennessee.....	Dec. 27, 1894	3,584	Natural park embracing the battle field of Shiloh near Pittsburg Landing.
Stones River.....	.....do.....	Mar. 3, 1927	(¹)	Scene of the Battle of Stones River in Tennessee.
Vicksburg.....	Mississippi.....	Feb. 21, 1899	1,324	Beautiful natural park; scene of the siege and surrender of Vicksburg in 1863 during the Civil War.

¹ Undetermined.² Donated in whole or in part to the United States.

NATIONAL PARKS TABLE 3.—*National monuments administered by the National Park Service*

[Number, 33, total area, 3,728 square miles]

Name	Location	When established	Area (acres)	Description
Arches-----	Utah-----	Apr. 12, 1929	4,520	Contains extraordinary examples of wind erosion in the shape of gigantic arches, windows, and other unique formations.
Aztec Ruins ² -----	New Mexico--	{Jan. 24, 1923 July 2, 1928	17½ 680	{Prehistoric ruin of pueblo type containing 500 rooms and other ruins. Cinder cone of geologically recent formation.
Capulin Mountain-----	-----do-----	Aug. 9, 1916		
Carlsbad Cave-----	-----do-----	Oct. 25, 1923	719	Beautifully decorated limestone cavern, believed to be largest yet discovered.
Casa Grande-----	Arizona-----	{June 22, 1892 ³ Dec. 10, 1909 Aug. 3, 1918 June 7, 1926	472	{These ruins are one of the most noteworthy relics of a prehistoric age and people within the limits of the United States. Discovered in ruinous condition in 1694. Numerous cliff-dweller ruins, including communal houses, in good condition, and but little excavated.
Chaco Canyon-----	New Mexico--	{Mar. 11, 1907 Jan. 10, 1928		
Colorado-----	Colorado-----	May 24, 1911	13,749	Many lofty monoliths, and is wonderful example of erosion, and of great scenic beauty and interest.
Craters of the Moon.	}Idaho-----	{May 2, 1924 July 23, 1928	49,565	{Best example of fissure lava flows; volcanic region with weird landscape effects. Remarkable natural rock tower, of volcanic origin, 1,200 feet in height.
Devils Tower-----		Sept. 24, 1906		
Dinosaur-----	Utah-----	Oct. 4, 1915	80	Deposits of fossil remains of prehistoric animal life of great scientific interest.
El Morro-----	New Mexico--	{Dec. 8, 1906 June 18, 1917	240	{Enormous sandstone rock eroded in form of a castle, upon which inscriptions have been placed by early Spanish explorers. Contains cliff-dweller ruins. Of great historic, scenic, and ethnologic interest.
Fossil Cycad-----	South Dakota	Oct. 21, 1922		
Glacier Bay-----	Alaska-----	Feb. 26, 1925	1,164,800	Area containing deposits of fossil plants.
Gran Quivira-----	New Mexico--	{Nov. 1, 1909 Nov. 25, 1919	424	{Contains tidewater glaciers of first rank. One of the most important of earliest Spanish mission ruins in the Southwest. Monument also contains pueblo ruins.
Hovenweep-----	Utah-Colorado	Mar. 2, 1923		
Katmai-----	Alaska-----	{Sept. 24, 1918 Sept. 5, 1923	1,087,990	{Four groups of prehistoric towers, pueblos, and cliff dwellings. Wonderland of great scientific interest in the study of volcanism. Phenomena exist upon a scale of great magnitude. Includes Valley of Ten Thousand Smokes.
Lewis and Clark Cavern. ²	}Montana-----	{May 11, 1908 May 16, 1911		
Montezuma Castle.		Dec. 8, 1906	¹ 160	{Immense limestone cavern of great scientific interest, magnificently decorated with stalactite formations. Now closed to public because of depredations by vandals.
Muir Woods ² -----	California-----	{Jan. 9, 1908 Sept. 22, 1921	426	{Prehistoric cliff-dweller ruin of unusual size situated in a niche in face of a vertical cliff. Of scenic and ethnologic interest. One of the most noted redwood groves in California; was donated by Hon. William Kent, ex-Member of Congress. Located 7 miles from San Francisco.
Natural Bridges---	Utah-----	{Apr. 16, 1908 Sept. 25, 1909 Feb. 11, 1916		
Navajo-----	Arizona-----	{Mar. 20, 1909 Mar. 14, 1912	360	{Three natural bridges, among largest examples of their kind. Largest bridge is 222 feet high, 65 feet thick at top of arch; arch is 28 feet wide; span, 261 feet; height of span, 157 feet. Other two slightly smaller.
Papago Saguaro-----	-----do-----	{Jan. 31, 1914 Dec. 28, 1922		

¹ Estimated.² Donated to the United States.³ From June 22, 1892, until Aug. 3, 1918, classified as a national park

NATIONAL PARKS TABLE 3.—*National monuments administered by the National Park Service—Continued*

Name	Location	When established	Area (acres)	Description
Petrified Forest...	Arizona.....	{ Dec. 8, 1906 July 31, 1911 }	25, 908	{ Abundance of petrified coniferous trees, one of which forms a small natural bridge. Is of great scientific interest.
Pinnacles.....	California.....	{ Jan. 16, 1908 May 7, 1923 July 2, 1924 }	2, 980	{ Many spirelike rock formations, 600 to 1,000 feet high, visible many miles; also numerous caves and other formations.
Pipe Spring.....	Arizona.....	May 31, 1923	40	Old stone fort and spring of pure water in desert region. Serves as memorial to early western pioneer life.
Rainbow Bridge..	Utah.....	May 30, 1910	160	Unique natural bridge of great scientific interest and symmetry. Height 309 feet above water, and span is 278 feet, in shape of rainbow.
Scotts Bluff.....	Nebraska.....	{ Dec. 12, 1919 May 9, 1924 }	1, 894	{ Region of historic and scientific interest. Many famous old trails traversed by the early pioneers in the winning of the West passed over and through this monument.
Shoshone Cavern..	Wyoming.....	Sept. 21, 1909	210	Cavern of considerable extent, near Cody.
Sitka.....	Alaska.....	Mar. 23, 1910	57	Park of great natural beauty and historic interest as scene of massacre of Russians by Indians. Contains 16 totem poles of best native workmanship.
Tumacacori.....	Arizona.....	Sept. 15, 1908	10	Ruin of Franciscan mission dating from seventeenth century. Being restored by National Park Service as rapidly as funds permit.
Verendrye.....	North Dakota..	June 29, 1917	250	Includes Crowhigh Butte, from which Explorer Verendrye first beheld territory beyond the Missouri River.
Wupatki.....	Arizona.....	Dec. 9, 1924	2, 234	Prehistoric dwellings of ancestors of Hopi Indians.
Yucca House ¹	Colorado.....	Dec. 19, 1919	9½	Located on eastern slope of Sleeping Ute Mountain. Is pile of masonry of great archeological value, relic of prehistoric inhabitants.

¹Donated to the United States.

NATIONAL PARKS TABLE 4.—*National monuments administered by the Department of Agriculture*

[Number, 15; total area, 591 square miles]

Name	Location	Date of creation	Area (acres)	Description
Bandelier.....	New Mexico..	Feb. 11, 1916	22, 075	Vast number of cliff-dweller ruins, with artificial caves, stone sculpture, and other relics of prehistoric life.
Chiricahua.....	Arizona.....	Apr. 18, 1924	4, 480	Natural rock formations within Coronado National Forest.
Devils Postpile....	California....	July 6, 1911	800	Spectacular mass of hexagonal basaltic columns, like an immense pile of posts. Said to rank with famous Giant's Causeway in Ireland.
Gila Cliff Dwellings.	New Mexico..	Nov. 16, 1907	160	Numerous cliff-dweller ruins of much interest and in good preservation.
Holy Cross.....	Colorado.....	May 11, 1929	1, 392	Figure in the form of a Greek Cross may be seen on the side of the Mount of the Holy Cross.
Jewel Cave.....	South Dakota.	Feb. 7, 1908	¹ 1, 280	Limestone cavern of much beauty and considerable extent, limits of which are as yet unknown.
Lava Beds.....	California....	Nov. 21, 1925	45, 967	Interesting ice caves. Battleground of Modoc Indian War, 1873.
Lehman Caves....	Nevada.....	Jan. 24, 1922	593	Limestone caverns of much beauty and of scientific interest and importance.
Mount Olympus..	Washington..	{ Mar. 2, 1909 Apr. 17, 1912 May 11, 1915 }	298, 730	{ Contains many objects of great and unusual scientific interest, including many glaciers. Is summer range and breeding ground of the Olympic elk.
Old Kasaan.....	Alaska.....	Oct. 25, 1916	38	Abandoned Indian village in which there are numerous remarkable totem poles and other objects of historical interest.
Oregon Caves....	Oregon.....	July 12, 1909	480	Extensive caves in limestone formation of much beauty; magnitude not entirely ascertained.
Timpanogos Cave.	Utah.....	Oct. 14, 1922	250	Limestone cavern.
Tonto.....	Arizona.....	Dec. 19, 1907	¹ 640	Numerous cliff-dweller ruins of much interest and in good preservation.
Walnut Canyon..	Arizona.....	Nov. 30, 1915	960	Contains cliff dwellings of much scientific and popular interest.
Wheeler.....	Colorado.....	Dec. 7, 1908	300	Of much interest from geological standpoint as example of eccentric erosion and volcanic action. Of much scenic beauty.

¹ Estimated.

NATIONAL PARKS TABLE 5.—*National monuments administered by the War Department*

[Number, 16; total area, 642 acres]

Name	Location	Date of creation	Area (acres)	Description
Abraham Lincoln's Birth-place.	Kentucky.....	July 17, 1916	110	Contains the log cabin and part of the farm where Abraham Lincoln was born.
Big Hole Battle Field.	Montana.....	June 23, 1910	5	Site of battle field on which battle was fought Aug. 9, 1877, between a small force of United States troops and a much larger force of Nez Perce Indians, resulting in rout for the Indians.
Cabrillo.....	California.....	{Oct. 14, 1913 May 12, 1926}	1½	{Of historic interest because of discovery of the territory now partly embraced in the State of California by Juan Rodriguez Cabrillo, who at this point first sighted land on Sept. 28, 1542.
Castle Pinckney..	South Carolina	Oct. 15, 1924	3½	Fortification built in 1810 to replace a Revolutionary fort.
Chalmette.....	Louisiana.....	May 24, 1907	17	Erected in memory of the Battle of New Orleans, which was fought on Jan. 8, 1815.
Fort Marion.....	Florida.....	Oct. 15, 1924	18	Fort built by Spaniards in 1656.
Fort Matanzas....	do.....	do.....	1	Relic of Spanish invasion.
Fort McHenry....	Maryland.....	Mar. 3, 1925	47	Restored and preserved as birthplace of "Star-Spangled Banner."
Fort Niagara.....	New York.....	Sept. 5, 1925	.0074	Site for erection of cross to commemorate a cross erected by Father Millett in 1688 on what is now the Fort Niagara Military Reservation.
Fort Pulaski.....	Georgia.....	Oct. 15, 1924	20	Built in 1810 to replace Fort Greene of the Revolution.
Fort Wood.....	New York.....	do.....	2½	Site of the Statue of Liberty.
Kennesaw Mountain	Georgia.....	Feb. 15, 1928	60	Site of important Civil War engagement fought June 27, 1864.
Kitty Hawk.....	North Carolina	Mar. 2, 1927	None.	Scene of first sustained flight by heavier-than-air machine.
Meriwether Lewis.	Tennessee.....	Feb. 6, 1925	300	Contains grave of Captain Lewis of the Lewis and Clark Expedition.
Mound City Group.	Ohio.....	Mar. 2, 1923	57	Famous group of prehistoric mounds in Camp Sherman Military Reservation.
White Plains Battle Field.	New York.....	May 18, 1926	None.	Memorial tablet to indicate the position of the Revolutionary Army under the command of General Washington.

APPENDIX B

TRAVEL AND FISCAL STATISTICS

NATIONAL PARKS TABLE 6.—*Visitors to national parks, 1914-1929*

Name of park	1914	1915	1916	1917	1918	1919	1920	1921
Acadia ¹						² 64,000	² 66,500	² 69,836
Crater Lake	7,096	11,371	12,265	11,645	13,231	16,645	20,135	28,617
General Grant	3,735	10,523	15,360	17,390	15,496	21,574	19,661	30,312
Glacier	14,168	14,265	12,839	18,387	9,086	18,956	22,449	19,736
Grand Canyon						37,745	67,315	67,485
Hawaii			(³)	(³)	(³)	(³)	(³)	² 16,071
Hot Springs	² 125,000	² 115,000	² 118,740	² 135,000	² 140,000	² 160,490	² 162,850	² 130,968
Lassen Volcanic			(³)	² 8,500	² 2,000	² 2,500	² 2,000	² 10,000
Mesa Verde	502	663	1,385	2,223	2,058	2,287	2,890	3,003
Mount McKinley				(³)	(³)	(³)	(³)	(³)
Mount Rainier	15,038	35,166	23,989	35,568	43,901	55,232	56,491	55,771
Platt	² 30,000	² 20,000	² 30,000	² 35,000	14,431	26,312	27,023	² 60,000
Rocky Mountain		² 31,030	² 51,000	117,186	101,497	169,492	240,966	² 273,737
Sequoia	4,667	7,647	10,780	18,510	15,001	30,443	31,508	28,263
Sullys Hill	² 500	² 1,000	² 1,500	2,207	4,188	4,026	9,341	9,100
Wind Cave	3,592	2,817	² 9,000	16,742	² 36,000	² 25,000	² 38,000	28,336
Yellowstone	20,250	51,895	35,849	35,400	21,275	62,261	79,777	81,651
Yosemite	15,145	33,452	33,390	34,510	33,497	58,362	68,906	91,513
Zion							3,692	² 937
Total	235,193	334,799	356,097	488,268	451,661	755,325	919,504	1,007,335

Name of park	1922	1923	1924	1925	1926	1927	1928	1929
Acadia ¹	73,779	64,200	71,758	73,673	101,256	123,699	134,897	149,554
Bryce Canyon								21,997
Crater Lake	33,016	52,017	64,312	65,018	86,019	82,354	113,323	128,435
General Grant	50,456	46,230	35,020	40,517	50,597	47,996	51,988	44,783
Glacier	23,935	3,988	33,372	40,063	37,325	41,745	53,454	70,742
Grand Canyon	84,700	102,166	108,256	134,053	140,252	162,356	167,226	184,093
Grand Teton								² 51,500
Hawaii	27,750	41,150	52,110	64,155	² 35,000	37,551	78,414	109,857
Hot Springs	² 106,164	² 112,000	² 164,175	² 265,500	² 260,000	² 181,523	² 199,099	184,517
Lassen Volcanic	² 10,000	² 9,500	² 12,500	² 12,956	18,739	20,089	26,057	26,106
Mesa Verde	4,251	5,236	7,109	9,043	11,356	11,915	16,760	14,517
Mount McKinley	⁵ 7	⁵ 34	⁵ 62	⁵ 206	⁵ 533	⁵ 651	⁵ 802	1,038
Mount Rainier	70,371	123,708	161,473	173,004	161,796	200,051	219,531	217,783
Platt	² 70,000	² 117,710	² 134,874	² 143,380	² 124,284	² 294,954	² 280,638	² 204,598
Rocky Mountain	⁴ 219,164	218,000	224,211	233,912	² 225,027	² 229,862	² 235,057	² 274,408
Sequoia	27,514	30,158	34,468	46,677	89,404	100,684	98,035	111,385
Sullys Hill	² 9,548	8,478	8,035	9,183	19,921	22,632	24,979	21,004
Wind Cave	31,016	41,505	52,166	69,267	85,466	81,023	100,309	108,943
Yellowstone	98,223	138,352	144,158	154,282	187,807	200,825	230,984	260,697
Yosemite	100,506	130,046	105,894	209,166	274,209	490,430	460,619	461,257
Zion	4,109	6,408	8,400	16,817	21,964	24,303	30,016	33,383
Total	1,044,502	1,280,886	1,422,353	1,760,512	1,930,865	2,354,643	2,522,188	2,680,597

¹ Formerly Lafayette National Park.

² Estimated.

³ No record.

⁴ Indicated loss in travel from 1921 due largely to better methods of checking and estimating employed.

⁵ Actual park visitors; some miners and prospectors also passed through park.

NATIONAL PARKS TABLE 7.—*Visitors to the national monuments in 1924-1929*¹

Name	1924	1925	1926	1927	1928	1929
Arches (Utah).....						² 500
Aztec Ruins (New Mexico).....	5,968	² 7,000	5,646	7,298	18,359	18,193
Capulin Mountain (New Mexico).....	² 7,000	² 7,000	14,965	12,617	² 7,600	² 12,000
Carlsbad Cave (New Mexico).....	³ 1,280	1,794	10,904	26,436	46,335	76,822
Casa Grande (Arizona).....	9,583	13,587	16,542	28,818	28,274	37,244
Chaco Canyon (New Mexico).....		² 2,000	2,500	² 1,500	1,425	² 2,750
Colorado (Colorado).....	² 8,000	² 9,000	² 9,000	² 9,500	² 10,000	² 12,000
Craters of the Moon (Idaho).....		3,349	4,620	5,771	7,768	7,730
Devils Tower (Wyoming).....	² 7,800	8,450	16,640	² 10,400	² 8,000	² 12,000
El Morro (New Mexico).....	² 3,200	² 1,800	5,794	5,178	5,356	2,625
Gran Quivira (New Mexico).....		² 1,000	1,577	2,034	2,779	3,357
Hovenweep (Utah-Colorado).....		² 250	² 250	263	² 240	² 450
Katmai (Alaska).....	17					
Montezuma Castle (Arizona).....	² 7,500	² 9,000	12,385	15,400	16,232	17,824
Muir Woods (California).....	92,391	93,643	97,426	101,514	103,571	93,358
Natural Bridges (Utah).....	62		68	82	175	² 260
Navajo (Arizona).....	85	200	² 250	² 260	315	965
Papago Saguaro (Arizona).....	² 10,000	² 30,000	² 53,000	60,540	66,450	² 87,600
Petrified Forest (Arizona).....	42,781	55,227	53,345	61,761	75,225	69,350
Pinnacles (California).....	8,973	² 10,000	10,167	11,265	13,216	10,756
Pipe Spring (Arizona).....		² 4,000	16,728	16,853	17,321	24,883
Rainbow Bridge (Utah).....	115	250	² 300	² 300	² 200	² 450
Scotts Bluff (Nebraska).....	² 35,000	² 24,000	² 27,000	² 30,000	² 37,500	² 42,500
Shoshone Cavern (Wyoming).....					² 300	
Sitka (Alaska).....			² 2,500	² 3,000	² 3,000	² 3,500
Tumacacori (Arizona).....	² 8,800	² 10,500	13,683	16,761	17,341	18,250
Verendrye (North Dakota).....		² 1,400	² 8,000	² 15,000	² 15,000	² 11,500
Wupatki (Arizona).....		² 500	² 600	² 450	² 500	² 550
Yucca House (Colorado).....		² 100	² 150	196	174	² 250
Total.....	248,555	294,050	384,040	443,197	502,656	567,667

¹ No records for other national monuments.² Estimated.³ Opened to public June 1, 1924.NATIONAL PARKS TABLE 8.—*Private automobiles entering the national parks during seasons 1922-1929*¹

Name of park	1922	1923	1924	1925	1926	1927	1928	1929
Acadia ^{2 3}	8,650	8,600	12,561	9,381	15,361	29,181	31,998	35,972
Bryce Canyon.....								5,223
Crater Lake.....	9,429	15,377	19,301	19,451	26,442	25,667	34,869	39,043
General Grant.....	12,010	12,036	9,118	11,108	12,869	13,172	14,681	12,995
Glacier.....	2,416	5,599	6,756	7,585	6,727	7,980	9,860	14,320
Grand Canyon.....	7,890	11,731	13,052	19,910	22,849	28,479	32,316	37,848
Grand Teton.....								⁴ 16,200
Hawaii ²		8,025	10,150	12,650	⁴ 6,500	8,345	14,505	18,347
Hot Springs ²						⁵ 1,559	⁶ 1,455	28,290
Lassen Volcanic ²				2,646	5,423	5,899	8,137	8,370
Mesa Verde.....	969	1,255	1,803	2,197	3,054	3,315	4,803	4,224
Mount Rainier.....	17,149	27,655	38,351	39,860	38,626	48,275	50,005	51,998
Platt ²	⁴ 30,000	⁴ 50,000	⁴ 57,400	⁴ 60,000	45,796	⁴ 75,000	⁴ 70,000	⁴ 65,000
Rocky Mountain ²	⁴ 52,112	⁴ 51,800	⁴ 53,696	⁴ 58,057	⁴ 50,407	⁴ 54,109	⁴ 57,381	⁴ 67,682
Sequoia ⁶	7,886	9,796	11,032	14,273	26,503	30,165	29,290	33,250
Sullys Hill ²				2,271	4,484	⁴ 7,700	5,229	4,936
Wind Cave ²	10,096	13,570	17,200	22,598	28,332	26,879	33,300	36,317
Yellowstone.....	18,253	27,359	30,689	33,068	⁵ 44,326	49,055	58,186	68,415
Yosemite.....	19,583	27,233	32,814	49,229	74,885	137,296	131,689	132,903
Zion.....	662	1,446	1,993	3,928	4,796	6,203	7,532	8,612
Total.....	197,105	271,482	315,916	368,212	417,386	557,079	595,236	689,945

¹ Automobiles entering parks with or without licenses, to and including Sept. 30, 1928.² No license required.³ Formerly Lafayette National Park.⁴ Estimated.⁵ Count made only at public camp ground.⁶ License required only for Giant Forest Road.

NATIONAL PARKS TABLE 9.—*Automobile and motor-cycle licenses issued during seasons 1925-1929*

Name of park ¹	1925		1926		1927		1928		1929	
	Auto-mobiles	Motor cycles	Auto-mobiles	Motor cycles	Auto-mobiles	Motor cycles	Auto-mobiles	Motor cycles	Auto-mobiles	Motor cycles
Crater Lake.....	15, 471	37	23, 249	35	15, 046	18	27, 898	46	23, 954	46
General Grant.....	7, 023	-----	4, 880	-----	6, 702	-----	6, 380	-----	6, 028	-----
Glacier.....	6, 039	3	5, 240	-----	5, 196	-----	7, 350	5	7, 577	-----
Grand Canyon.....	-----	-----	9, 707	-----	21, 629	-----	26, 429	-----	29, 229	-----
Mesa Verde.....	2, 075	3	3, 222	3	2, 959	7	4, 256	13	3, 926	9
Mount Rainier.....	21, 753	23	20, 490	101	28, 340	47	32, 885	33	32, 184	61
Sequoia ²	4, 312	-----	10, 781	-----	16, 383	-----	16, 599	-----	16, 799	-----
Yellowstone.....	31, 488	144	38, 942	135	43, 062	191	54, 139	179	56, 150	159
Yosemite.....	23, 203	68	29, 302	82	96, 580	218	75, 213	183	74, 229	167
Zion.....	-----	-----	3, 596	-----	4, 069	481	6, 107	-----	6, 822	-----
Total.....	111, 364	278	149, 109	356	239, 966	262	257, 256	459	256, 898	442

¹ No licenses required for Wind Cave, Hot Springs, Platt, Hawaii, Lassen Volcanic, Sullys Hill, Rocky Mountain, Mount McKinley, and Acadia National Parks.

² License required only for Giant Forest Road.

Licenses not required in certain parks because of small road mileage or unimproved condition of roads (see footnote 1). Licenses also not required for travel on unimproved roads in other parks. No charge for license issued for operating cars on official business.

NATIONAL PARKS TABLE 10.—*Receipts collected from automobiles and motor-cycles during seasons 1925-1929*

Name of park ¹	1925	1926 ²	1927	1928	1929
Crater Lake.....	\$38, 714. 50	\$26, 594. 50	\$15, 064. 00	\$27, 944. 00	\$24, 000. 00
General Grant.....	3, 511. 50	2, 440. 00	3, 351. 00	3, 190. 00	3, 014. 00
Glacier.....	9, 338. 50	5, 240. 00	5, 196. 00	7, 355. 00	7, 577. 00
Grand Canyon.....	-----	9, 707. 00	21, 629. 00	26, 429. 00	29, 300. 00
Mesa Verde.....	3, 114. 00	3, 377. 00	2, 965. 50	4, 269. 00	3, 944. 00
Mount Rainier.....	54, 405. 50	21, 488. 00	28, 387. 00	32, 918. 00	32, 245. 00
Sequoia ³	10, 780. 00	10, 481. 00	16, 383. 00	16, 599. 00	16, 799. 00
Yellowstone.....	236, 520. 60	119, 286. 50	129, 377. 00	162, 596. 00	168, 608. 00
Yosemite.....	114, 556. 00	75, 179. 00	192, 370. 00	150, 609. 00	148, 613. 00
Zion.....	-----	1, 798. 00	2, 034. 50	3, 053. 50	3, 431. 50
Total.....	470, 940. 00	275, 591. 00	416, 757. 00	434, 962. 50	437, 531. 50

¹ No licenses required for Wind Cave, Hot Springs, Platt, Hawaii, Lassen Volcanic, Sullys Hill, Rocky Mountain, Mount McKinley, and Acadia National Parks.

² Rates reduced in 1926.

³ License required only for Giant Forest Road.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917–1929,¹ inclusive; also appropriations for the fiscal year 1930*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Acadia (formerly Lafayette):				
1919.....	² \$10,000.00	\$9,972.42	-----	-----
1920.....	10,000.00	9,930.06	-----	-----
1921.....	20,000.00	19,997.73	-----	-----
1922.....	25,000.00	24,992.99	-----	-----
1923.....	25,000.00	24,819.20	-----	-----
1924.....	30,000.00	29,785.89	-----	-----
1925.....	34,700.00	} 37,258.20	-----	-----
1925 (deficiency).....	2,820.00		-----	-----
1926.....	34,190.00	33,636.66	-----	-----
1927.....	34,000.00	33,614.22	-----	-----
1928.....	37,940.00	37,376.99	-----	-----
1929.....	39,000.00	} 40,014.00	-----	-----
1929 (deficiency).....	1,355.00		-----	-----
1930.....	52,600.00	-----	-----	-----
Bryce Canyon:				
1930.....	26,100.00	-----	-----	-----
Crater Lake:				
1917.....	8,000.00	7,999.88	\$4,565.25	-----
1918.....	15,000.00	14,738.44	5,505.72	-----
1919.....	13,225.00	13,203.84	5,958.21	(³)
1920.....	28,225.00	28,162.05	8,327.73	-----
1921.....	25,300.00	25,223.40	9,784.98	-----
1922.....	25,300.00	25,290.41	15,277.53	-----
1923.....	32,000.00	31,787.77	18,139.75	-----
1924.....	35,000.00	34,822.56	30,495.93	-----
1925.....	30,700.00	} 32,613.36	39,789.49	-----
1925 (deficiency).....	1,980.00		-----	-----
1926.....	35,980.00	35,865.26	41,486.50	-----
1927.....	37,160.00	36,733.05	20,232.00	-----
1928.....	63,590.00	62,382.53	22,927.69	-----
1929.....	47,100.00	} 61,464.00	24,318.22	-----
1929 (deficiency).....	850.00		-----	-----
1930.....	59,800.00	-----	-----	-----
General Grant:				
1917.....	2,000.00	1,999.55	1,153.78	\$536.97
1918.....	2,000.00	1,999.97	1,801.63	3,951.88
1919.....	4,500.00	4,481.51	1,063.90	(³)
1920.....	6,000.00	5,992.79	1,870.83	-----
1921.....	5,300.00	5,300.00	2,663.37	-----
1922.....	6,000.00	5,981.24	3,480.45	-----
1923.....	6,500.00	6,419.88	3,180.16	-----
1924.....	50,000.00	49,874.91	4,847.73	-----
1925.....	14,175.00	} 15,151.51	2,907.54	-----
1925 (deficiency).....	1,180.00		-----	-----
1926.....	12,180.00	11,986.37	3,298.55	-----
1927.....	12,300.00	12,299.73	3,686.63	-----
1928.....	13,650.00	13,529.26	3,488.90	-----
1929.....	15,650.00	} 15,802.00	3,305.70	-----
1929 (deficiency).....	500.00		-----	-----
1930.....	15,650.00	-----	-----	-----
Glacier:				
1917.....	110,000.00	108,148.16	3,202.40	1,352.75
1918.....	150,000.00	114,362.82	4,438.22	9,026.86
1919.....	80,000.00	79,958.69	2,624.53	(³)
1920.....	85,800.00	85,000.00	7,253.85	-----
1920 (deficiency).....	81,849.12	81,572.94	-----	-----
1921.....	95,000.00	} 107,847.30	10,513.20	-----
1921 (deficiency).....	12,564.09		-----	-----
1922.....	195,000.00	194,803.03	6,082.71	-----
1923.....	178,700.00	178,515.70	10,732.67	-----
1924.....	225,000.00	227,133.13	19,759.23	-----
1925.....	281,000.00	} 288,233.45	15,328.71	-----
1925 (deficiency).....	9,260.00		-----	-----
1926.....	184,960.00	172,888.11	21,311.72	-----
1927.....	167,745.00	165,392.38	12,020.58	-----
1928.....	163,300.00	162,525.28	14,652.59	-----
1929.....	188,200.00	} 191,061.00	18,436.18	-----
1929 (deficiency).....	5,065.00		-----	-----
1930.....	219,400.00	-----	-----	-----

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917-1921,¹ inclusive; also appropriations for the fiscal year 1930—Continued*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Grand Canyon:				
1919.....			\$525.03	(³)
1920.....	\$40,000.00	\$39,874.27	399.32	
1921.....	60,000.00	59,948.45	8,305.43	
1922.....	100,000.00	99,966.55	4,872.02	
1923.....	75,000.00	73,906.35	7,508.72	
1924.....	125,400.00	⁴ 124,798.40	12,655.42	
1925 (without year).....	100,000.00	63,757.24		
1925.....	116,000.00	115,908.64	12,550.06	
1925 (deficiency).....	4,360.00			
1926.....	192,360.00	189,579.00	15,806.45	
1927.....	132,000.00	127,097.12	41,300.12	
1928.....	128,760.00	128,268.33	46,097.43	
1929.....	169,000.00	⁴ 151,813.00	49,078.33	
1929 (deficiency).....	3,540.00			
1930.....	145,000.00			
Grand Teton:				
1929.....			25.00	
Hawaii:				
1919.....	750.00	731.40		
1920.....	750.00	747.52		
1921.....	1,000.00	125.00		
1922.....	10,000.00	9,645.16		
1923.....	10,000.00	9,969.03	775.00	
1924.....	10,000.00	9,658.74	1,460.00	
1925.....	10,000.00	9,463.09	760.00	
1925 (deficiency).....	1,260.00			
1926.....	15,560.00	13,349.54	2,450.00	
1927.....	18,000.00	17,765.44	1,975.00	
1928.....	18,250.00	18,119.10	1,450.00	
1929.....	21,500.00	⁴ 21,070.00	1,477.00	
1929 (deficiency).....	785.00			
1930.....	27,400.00			
Hot Springs:				
1917.....			35,611.75	\$31,302.98
1918.....			28,883.44	42,822.02
1919.....	⁶ 140,000.00	140,000.00	52,109.15	32,130.36
1920.....			45,682.85	35,710.33
1921 (deficiency).....	60,000.00	60,000.00	57,807.00	74,021.19
1922.....			55,339.15	85,043.85
1923.....	63,900.00	63,289.88	56,669.16	(⁹)
1924.....	67,600.00	67,294.82	44,769.53	
1925.....	78,000.00	⁴ 85,541.38	⁶ 50,577.70	
1925 (deficiency).....	11,800.00			
1926.....	72,100.00	69,537.19	⁶ 55,421.75	
1927.....	71,000.00	69,767.10	47,535.70	
1928.....	69,800.00	67,443.19	47,695.50	
1929.....	68,000.00	⁴ 71,970.00	47,930.90	
1929 (deficiency).....	6,320.00			
1930.....	70,900.00			
Lassen Volcanic:				
1917.....			81.25	(³)
1918.....			118.05	
1921.....	2,500.00	2,410.90		
1922.....	3,000.00	2,922.41		
1923.....	3,000.00	2,963.42	228.66	
1924.....	3,000.00	2,865.61	277.27	
1925.....	3,000.00	2,957.51	170.96	
1925 (deficiency).....	100.00			
1926.....	10,000.00	9,783.06	135.97	
1927.....	12,700.00	12,362.26	194.48	
1928.....	15,625.00	15,448.52	167.84	
1929.....	22,400.00	⁴ 22,688.00	34.36	
1929 (deficiency).....	460.00			
1930.....	25,300.00			
Mesa Verde:				
1917.....	10,000.00	9,999.00	130.14	(¹⁰)
1918.....	10,000.00	9,913.05	2,763.75	
1919.....	18,000.00	17,022.44	3,348.66	
1920.....	11,000.00	10,959.69	3,317.95	
1921.....	14,000.00	13,929.71	3,771.35	
1922.....	16,400.00	16,339.30	1,273.72	
1923.....	43,000.00	42,812.62	3,690.10	

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917–1921,¹ inclusive; also appropriations for the fiscal year 1930—Continued*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Mesa Verde—Continued.				
1924.....	\$35,000.00	} \$36,685.21	\$4,071.65	-----
1924 (deficiency).....	3,000.00			
1925.....	42,500.00	} 43,183.46	3,599.45	-----
1925 (deficiency).....	1,895.00			
1926.....	42,835.00	42,596.97	3,221.15	-----
1927.....	72,300.00	70,591.36	4,391.00	-----
1928.....	50,750.00	48,343.59	3,342.80	-----
1929.....	83,000.00	} 78,134.00	4,719.00	-----
1929 (deficiency).....	1,115.00			
1930.....	57,000.00	-----	-----	-----
Mount Rainier:				
1917.....	30,000.00	29,999.19	14,346.80	\$17,617.04
1918.....	75,000.00	74,846.67	17,241.25	34,715.96
1919.....	24,600.00	24,552.28	17,336.47	(³)
1920.....	32,500.00	32,446.01	22,153.76	-----
1921.....	40,000.00	39,819.34	24,967.79	-----
1922.....	150,000.00	149,497.31	22,286.59	-----
1923.....	106,800.00	105,721.05	29,133.17	-----
1924.....	133,000.00	135,813.76	43,014.33	-----
1924 (deficiency).....	\$ 13,000.00	} 117,906.78	51,395.58	-----
1925.....	100,000.00			
1925 (deficiency).....	5,230.00	} 101,777.55	56,631.25	-----
1926.....	106,500.00			
1927.....	111,000.00	109,768.24	28,613.30	-----
1928.....	108,000.00	105,447.74	32,495.50	-----
1929.....	141,000.00	} 141,285.00	39,233.17	-----
1929 (deficiency).....	3,370.00			
1929–30 (deficiency).....	2,500.00	-----	-----	-----
1930.....	122,600.00	-----	-----	-----
Mount McKinley:				
1922.....	8,000.00	7,792.88	-----	-----
1923.....	8,000.00	7,850.61	-----	-----
1924.....	8,000.00	7,730.85	-----	-----
1925.....	11,020.00	} 11,497.89	68.93	(3)
1925 (deficiency).....	700.00			
1926.....	13,800.00	13,575.86	135.45	-----
1927.....	18,700.00	18,474.18	45.68	-----
1928.....	22,000.00	21,314.12	63.04	-----
1929.....	35,900.00	} 36,165.00	1.00	-----
1929 (deficiency).....	740.00			
1930.....	40,000.00	-----	-----	-----
Platt:				
1917.....	8,000.00	8,000.00	434.11	138.28
1918.....	7,180.00	7,179.84	1,010.40	1,699.88
1919.....	7,500.00	7,485.05	482.63	(3)
1920.....	6,000.00	5,980.24	486.59	-----
1921.....	9,000.00	8,900.70	726.20	-----
1922.....	7,500.00	7,238.26	519.80	-----
1923.....	7,500.00	7,325.62	65.30	-----
1924.....	10,000.00	9,982.48	74.14	-----
1925.....	10,000.00	} 11,916.20	60.50	-----
1925 (deficiency).....	1,920.00			
1926.....	17,920.00	17,818.60	54.13	-----
1927.....	12,400.00	12,148.42	50.00	-----
1928.....	13,050.00	12,991.87	77.16	-----
1929.....	18,000.00	} 19,053.00	33.05	-----
1929 (deficiency).....	1,050.00			
1930.....	16,200.00	-----	-----	-----
Rocky Mountain:				
1917.....	10,000.00	9,964.24	871.27	(10)
1918.....	10,000.00	9,922.10	598.75	-----
1919.....	10,000.00	9,993.94	307.50	-----
1920.....	10,000.00	9,924.85	1,507.78	-----
1921.....	40,000.00	39,945.40	537.25	-----
1922.....	65,000.00	64,923.10	2,695.41	-----
1923.....	73,900.00	73,153.99	3,077.08	-----
1924.....	74,280.00	74,000.03	582.38	-----
1924 (deficiency).....	\$ 26,171.00	} 122,888.53	3,183.83	-----
1925.....	93,000.00			
1925 (deficiency).....	4,540.00	} 82,259.56	2,538.35	-----
1926.....	84,660.00			
1927.....	87,000.00	85,844.22	2,401.88	-----
1928.....	97,620.00	95,612.07	924.12	-----

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917–1921,¹ inclusive; also appropriations for the fiscal year 1930—Continued*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Rocky Mountain—Continued.				
1929.....	\$95,500.00	} \$95,230.00	\$1,537.07	-----
1929 (deficiency).....	2,380.00			
1930.....	96,000.00			
Sequoia:				
1917.....	{ 22,300.00	15,605.28	} 10,326.60	\$415.04
1918.....	{ 50,000.00	50,000.00		
1919.....	{ 25,000.00	24,578.71		
1920.....	30,510.00	30,420.98	9,772.52	25,508.45
1921.....	35,000.00	34,824.54	15,899.00	(³)
1922.....	36,000.00	35,732.79	19,584.99	-----
1923.....	86,000.00	85,961.84	20,086.27	-----
1924.....	78,000.00	77,671.62	23,917.22	-----
1925.....	120,000.00	119,590.60	24,220.21	-----
1925 (deficiency).....	136,000.00	} 140,638.90	19,981.08	-----
1926.....	5,810.00			
1927.....	71,710.00			
1928.....	73,750.00	73,731.58	26,356.16	-----
1929.....	109,000.00	108,863.10	29,486.10	-----
1929 (deficiency).....	113,000.00	} \$114,626.00	30,753.00	-----
1930.....	3,440.00			
1930.....	130,000.00			
Wind Cave:				
1917.....	2,500.00	2,499.87	1,632.60	1,013.04
1918.....	2,500.00	2,498.40	4,082.60	8,006.53
1919.....	4,000.00	3,988.77	2,533.15	(³)
1920.....	4,000.00	3,987.24	3,714.15	-----
1921.....	5,000.00	4,971.55	2,918.20	-----
1922.....	7,500.00	7,500.00	3,785.25	-----
1923.....	7,500.00	7,443.84	3,869.00	-----
1924.....	10,000.00	9,934.56	3,856.50	-----
1925.....	10,000.00	} 10,800.63	4,232.61	-----
1925 (deficiency).....	960.00			
1926.....	10,960.00			
1927.....	10,275.00	11,827.07	5,934.54	-----
1928.....	10,850.00	10,228.26	6,840.50	-----
1929.....	11,000.00	11,500.00	12,725.50	-----
1929 (deficiency).....	760.00	} 11,744.00	13,178.17	-----
1930.....	13,500.00			
Yellowstone:				
1917.....	8,500.00	8,500.00	54,795.69	53,775.61
1918.....	10,500.00	9,645.82	71,393.56	96,812.34
1919.....	334,920.00	332,583.03	42,775.50	(³)
1920.....	7 3,259.48	539.44	-----	-----
1920 (deficiency).....	255,500.00	253,577.15	120,027.61	-----
1921.....	71,026.64	71,026.64	-----	-----
1921 (deficiency).....	278,000.00	} 285,992.28	158,806.84	-----
1922.....	8,000.00			
1923.....	350,000.00			
1924.....	361,800.00	348,746.54	165,014.53	-----
1924 (deficiency).....	368,000.00	361,687.86	203,140.02	-----
1925.....	27,700.00	} 395,139.06	299,132.97	-----
1925 (deficiency).....	372,800.00			
1926.....	24,103.00			
1927.....	396,000.00	394,086.50	318,861.60	-----
1928.....	398,000.00	393,190.23	356,193.56	-----
1929.....	400,000.00	394,946.95	230,674.69	-----
1929 (deficiency).....	434,000.00	399,150.00	251,663.11	-----
1930.....	12,230.00	} 443,230.00	289,388.95	-----
1930.....	453,000.00			
Yosemite:				
1917.....	250,000.00	249,987.45	53,500.66	55,098.45
1918.....	235,000.00	226,368.29	65,865.65	88,975.62
1919.....	255,000.00	254,294.64	57,520.03	(³)
1920.....	200,000.00	197,611.29	85,601.54	-----
1921.....	300,000.00	} 300,645.44	95,894.47	-----
1921 (deficiency).....	3,000.00			
1922.....	300,000.00			
1923.....	280,000.00	295,079.94	131,797.51	-----
1924.....	295,000.00	278,218.50	148,860.60	-----
1925.....	309,000.00	294,768.42	173,732.28	-----
1925 (deficiency).....	21,414.00	} 324,414.85	137,200.14	-----
1926.....	252,714.00			

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917–1929,¹ inclusive; also appropriations for the fiscal year 1930—Continued.*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Yosemite—Continued.				
1927	\$256,640.00	\$251,814.59	\$239,382.94	
1928	301,000.00	} 257,363.73	276,438.20	
1928 (deficiency)	15,000.00			
1929	387,250.00	} 449,159.00	237,166.90	
1929 (deficiency)	14,385.00			
1930	412,360.00			
Zion:				
1917 (deficiency)	15,000.00	14,963.81		
1920			511.50	(9)
1921	7,300.00	} 8,825.96	524.00	
1921 (deficiency)	1,585.07			
1922	10,000.00	9,968.62	414.95	
1923	10,000.00	9,727.39	584.37	
1923–24 (deficiency)	133,000.00	} 144,066.88	913.25	
1924	13,750.00			
1925	15,190.00	} 15,282.02	195.80	
1925 (deficiency)	1,560.00			
1926	20,000.00	19,968.90	479.50	
1927	22,000.00	21,637.39	2,231.00	
1928	30,900.00	30,737.69	3,106.50	
1929	40,500.00	} 40,569.00	3,576.50	
1929 (deficiency)	795.00			
1930	38,300.00			
Protection of national monuments:				
1917	3,500.00	2,586.66		
1918	5,000.00	4,832.70	225.00	(11)
1919	10,000.00	9,473.10	320.75	
1920	8,000.00	7,802.92	123.50	
1921	8,000.00	7,838.99	123.20	
1922	12,500.00	12,019.98	39.00	
1923	12,500.00	11,385.55	135.38	
1924	12,500.00	11,774.15	23.50	
1925	20,750.00	} 21,179.10	57.00	
1925 (deficiency)	1,230.00			
1926	46,980.00	46,752.31	72.00	
1927	21,270.00	21,094.93	66.00	
1928	25,000.00	24,042.56	132.00	
1929	35,000.00	} 35,951.00	97.00	
1929 (deficiency)	1,225.00			
1930	46,000.00			
Casa Grande National Monument:				
1917	900.00	(12)		
1918	900.00	(12)		
1919	900.00	(12)		
Improvement of Navajo National Monument, Ariz.: 1917	13 3,000.00	1,962.69		
Carlsbad Cave National Monument:				
1926	(14)		3,718.00	
1927	15,000.00	14,467.80	32,628.00	
1928	30,000.00	28,492.84	55,682.00	
1929	70,000.00	} 63,490.00	84,983.45	
1929 (deficiency)	260.00			
1930	100,000.00			
National Park Service:				
1917	3,666.67	2,513.62		
1918	17,600.00	17,413.33		
1919	19,200.00	19,177.50		
1920	22,220.00	21,524.46		
1921	27,420.00	27,090.59		
1922	31,020.00	30,957.72		
1923	32,420.00	32,383.50		
1924	33,200.00	32,922.67		
1925	44,000.00	} 46,632.92		
1925 (deficiency)	2,700.00			
1926	51,000.00			
1927	55,680.00	55,678.35	94.00	
1928	57,100.00	57,047.56	20.10	
1929	70,200.00	} 75,714.00		
1929 (deficiency)	4,660.00			
1930	80,830.00			

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917–1921,¹ inclusive; also appropriations for the fiscal year 1930—Continued*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Fighting forest fires:				
1922.....	\$25,000.00	\$9,618.30	-----	-----
1923.....	25,000.00	17,764.16	-----	-----
1924.....	25,000.00	6,526.02	-----	-----
1925.....	20,000.00	20,000.00	-----	-----
Emergency reconstruction: 1925.....	20,000.00	17,069.15	-----	-----
Emergency reconstruction and fighting forest fires:				
1926.....	40,000.00	80,000.00	-----	-----
1926 (deficiency).....	40,000.00		-----	-----
1927.....	40,000.00	40,000.00	-----	-----
1927 (deficiency).....	235,000.00	228,647.83	-----	-----
1928.....	40,000.00	¹⁶ 26,865.46	-----	-----
1929 (deficiency).....	29,000.00	40,138.26	-----	-----
1930.....	20,000.00	-----	-----	-----
Accounting services:				
1923.....	6,000.00	5,216.60	-----	-----
1924.....	6,000.00	5,992.11	-----	-----
1925.....	6,000.00	5,564.15	-----	-----
1926.....	6,000.00	5,899.19	-----	-----
1927.....	-----	-----	-----	-----
1928.....	6,000.00	5,835.71	-----	-----
Construction of roads and trails:				
1925 (deficiency).....	1,000,000.00	995,200.61	-----	-----
1926.....	1,500,000.00	1,500,000.00	-----	-----
1927.....	2,000,000.00	2,000,000.00	-----	-----
1928.....	2,000,000.00	2,000,000.00	-----	-----
1928 (deficiency).....	1,000,000.00	1,000,000.00	-----	-----
1929.....	2,500,000.00	2,500,000.00	-----	-----
1930.....	5,000,000.00	-----	-----	-----
Insect control:				
1925–26 (deficiency).....	25,000.00	24,945.24	-----	-----
1927.....	20,000.00	19,828.96	-----	-----
1928.....	7,500.00	7,379.35	-----	-----
Southern Appalachian:				
1925–26 (deficiency).....	20,000.00	12,453.27	-----	-----
1927.....	⁽¹⁵⁾ -----	7,252.21	-----	-----
1928.....	5,000.00	¹⁶ 3,887.13	-----	-----
1929.....	4,500.00	¹⁷ 3,945.07	-----	-----
1930.....	3,000.00	-----	-----	-----
Purchase of lands:				
1928.....	50,000.00	13,925.00	-----	-----
1929.....	50,000.00	1,383.00	-----	-----
1930.....	250,000.00	-----	-----	-----
Extension of winter-feed facilities: 1930.....	75,000.00	-----	-----	-----

¹ For statement of appropriations and revenues prior to 1917 see 1920 Annual Report, pp. 354–358.

² Appropriation for 1919 made under the name of Sieur de Monts National Monument.

³ Expenditure of revenue for park purposes not authorized. Sundry civil act of June 12, 1917 (40 Stat. 153); Hot Springs, act of May 24, 1922 (42 Stat. 590).

⁴ Appropriation transfer. See Table 13.

⁵ Made available during fiscal years 1920 and 1921 by sundry civil acts approved July 19, 1919 (41 Stat. 204), and June 5, 1920 (41 Stat. 918).

⁶ Includes \$15,855 from sale of lots in 1925; \$8,500 in 1926.

⁷ Unexpended balance of 1918 War Department appropriation of \$20,000 made available under Interior Department during 1919. Sundry civil act of July 1, 1918 (40 Stat. 678).

⁸ Made available during 1925, act of Mar. 4, 1925 (43 Stat. 1331).

⁹ For purchase of private holdings.

¹⁰ Expenditure of revenues from Mesa Verde and Rocky Mountain Parks for park purposes not authorized by statute.

¹¹ Expenditure of revenue for monument purposes not authorized.

¹² Expended under the direction of the Commissioner of the General Land Office.

¹³ Expended under direction of Smithsonian Institution.

¹⁴ \$5,000 and \$25,000 of appropriation for protection of national monuments for 1925 and 1926, respectively, specifically made available for Carlsbad Cave.

¹⁵ Unexpended balance of 1925–26 appropriation made available for expenditure in 1927. Act of July 3, 1926 (44 Stat. 837).

¹⁶ \$35,000 reappropriated and made available for expenditure in Yosemite during fiscal year 1929; \$1,112.87 reappropriated and made available for expenditure for Southern Appalachian during fiscal year 1929; \$13,134.54 reappropriated and made available for expenditure for emergency reconstruction and fighting forest fires during fiscal year 1929.

¹⁷ \$8,661.78 reappropriated and made available for expenditure in Yosemite during fiscal year 1930; \$4,950.00 reappropriated and made available for expenditure at Carlsbad Cave during fiscal year 1930; \$1,667.80 reappropriated and made available for expenditure for Southern Appalachian during fiscal year 1930.

NATIONAL PARKS TABLE 12.—*Summary of appropriations for the administration, protection, and improvement of the national parks and national monuments, together with the revenues received, for the fiscal years 1917¹–1930, inclusive*

Year	Department	Appropriation	Revenues
1917	Interior Department.....	\$537,366.67	
	War Department.....	247,200.00	
		\$784,566.67	\$180,652.30
1918	Interior Department.....	530,680.00	
	War Department.....	217,500.00	
		748,180.00	² 217,330.55
1919	Interior Department.....	963,105.00	
	War Department.....	50,000.00	
		1,013,105.00	196,678.03
1920		907,070.76	316,877.96
1921		1,058,969.16	396,928.27
1922		1,433,220.00	432,964.89
1923		1,446,520.00	513,706.36
1924		1,892,601.00	663,886.32
1925		3,027,657.00	670,920.98
1926		3,258,409.00	826,454.17
1927		3,698,920.00	703,849.60
1928		4,889,685.00	808,255.81
1929		4,754,015.00	849,272.95
1930		7,598,440.00	

¹ For summary of appropriations and revenues prior to 1917 see 1920 Annual Report, p. 359.

² The revenues from the various national parks were expendable during the years 1904 to 1918, inclusive, with the exception of those received from Crater Lake, Mesa Verde, and Rocky Mountain National Parks, the revenues from which were turned into the Treasury to the credit of miscellaneous receipts.

NATIONAL PARKS TABLE 13.—*Statement of amounts transferred under the authority contained in the appropriation acts to transfer 10 per cent from one appropriation to another*

Year	Amount	From—	To—
1924.....	\$3,000	Yosemite National Park.....	Mount Rainier National Park.
1924.....	1,000	do.....	Mesa Verde National Park.
1924.....	1,000	Zion National Park.....	Do.
1924.....	1,900	Mesa Verde National Park.....	Glacier National Park.
1924.....	800	Grand Canyon National Park.....	Do.
1924.....	200	Yellowstone National Park.....	Do.
1925.....	1,000	Hot Springs National Park.....	Zion National Park.
1925.....	500	Grand Canyon National Park.....	Do.
1926.....	1,000	Yellowstone National Park.....	Wind Cave National Park.
1926.....	913	do.....	Sequoia National Park.
1926.....	1,062	Rocky Mountain National Park.....	Mount Rainier National Park.
1927.....	200	Grand Canyon National Park.....	Sequoia National Park.
1928.....	200	do.....	Wind Cave National Park.
1928.....	450	Yellowstone National Park.....	Do.
1929.....	125	Crater Lake National Park.....	National Park Service.
1929.....	150	Hawaii National Park.....	Do.
1929.....	117	Mesa Verde National Park.....	Do.
1929.....	125	Mount McKinley National Park.....	Do.
1929.....	200	Mount Rainier National Park.....	Do.
1929.....	100	Rocky Mountain National Park.....	Do.
1929.....	100	Carlsbad Cave National Park.....	Do.
1929.....	1,100	Glacier National Park.....	Crater Lake National Park.
1929.....	700	Grand Canyon National Park.....	Do.
1929.....	85	Hawaii National Park.....	Do.
1929.....	400	Hot Springs National Park.....	Do.
1929.....	115	Lassen Volcanic National Park.....	Do.
1929.....	4,000	Mesa Verde National Park.....	Do.
1929.....	1,000	Mount Rainier National Park.....	Do.
1929.....	2,000	Rocky Mountain National Park.....	Do.
1929.....	700	Sequoia National Park.....	Do.
1929.....	3,000	Yellowstone National Park.....	Do.
1929.....	600	Yosemite National Park.....	Do.

APPENDIX C

REPORTS OF OFFICERS IN CHARGE OF THE NATIONAL PARKS, MONUMENTS, AND ENGINEERING, EDUCATIONAL, AND FORESTRY DIVISIONS

ACADIA NATIONAL PARK

GEORGE B. DORR, Superintendent, Bar Harbor, Me.

Acadia National Park, the former Lafayette National Park, has had the most eventful year since its establishment 10 years ago, thanks to the warm interest taken in it by Congressman Cramton, of Michigan, chairman of the House Committee on Appropriations, Interior Department, who visited it for the first time last fall and through whose cooperation with the Hon. John E. Nelson, of Maine, Representative from its district, an act to change the name of the park to Acadia and to enlarge beyond the bounds of Mount Desert Island the authority given the Secretary of the Interior to accept lands donated for its increase was passed last winter. The passage of this act made possible the acceptance of a magnificent tract of land, Schoodic Point, framing the entrance to Frenchmans Bay upon the eastern side as Mount Desert Island does upon the western and comprising in a wild and wooded area of from 1,500 to 2,000 acres a superb headland and miles of surf-swept, rocky shore jutting far into the ocean.

The headland on this tract rises boldly from the shore on either side to an elevation of over 400 feet and commands one of the finest coastal views the world affords, eastward toward the entrance of the Bay of Fundy, southward to a boundless sea horizon, and westward across the island-broken entrance of Frenchmans Bay to the mountains of the national park.

A good road is needed for the development of this new territory of the park, it having at present none but an old horse road of the early time, narrow, rough, and winding, and now wrecked beyond repair by water, use, and time. A preliminary survey and thorough study of the need and opportunity by the Federal Bureau of Public Roads is called for.

HOMANS PROPERTY

Another feature of great interest in the park's development during the past year, also made possible through the interest and cooperation of Congressman Cramton, is the acquisition by the park of one of the earliest summer homes and most beautiful sites upon Mount Desert Island, whose lands connect uninterruptedly westward with mountain lands long since secured and front boldly eastward across the entrance to Frenchmans Bay to the newly acquired Schoodic territory.

From the owner of this land, Mrs. Charles D. Homans, of Boston, came the earliest considerable donation of land received by the trustees of public reservations, whose gift to the Government initiated the national park. In her memory the house, repaired and put in order, will be named the Homans House, and used in connection with park administration. The work of restoration, through an appropriation obtained for the purpose by Mr. Cramton, is well advanced, and the house, beautiful beyond expectation, will henceforth be a leading and central feature of the park.

The restoration of the Homans House has already won for the park a magnificent tract of land adjoining and superbly widening its site and frontage on the sea, which has been recently acquired for future inclusion in the park when plans for its development in conjunction with the Homans property have been worked out.

UTILITY BUILDING

Work on the utility building for which an appropriation of \$3,000 was made has been delayed owing to the need felt for further study of its location, on land to be donated for the purpose, in relation to the planned approach from the park office at Bar Harbor to the park's mountain areas. A structure of this character can be erected quickly when the site is chosen.

CADILLAC-MOUNTAIN ROAD

After long delay, owing to transfer of construction to the Federal Bureau of Roads and a new survey of route, the road to the summit of Cadillac Mountain, the highest point in the park or on our eastern coast, is again under way under a contract which promises its completion, apart from surfacing, by next summer and final completion for the season of 1931. This is the only road to a mountain summit contemplated in the park and will be of outstanding interest to motorists from every eastern section of the country, commanding magnificent and unique views of mingled land and sea to far horizons.

FLYING SERVICE

The commencement of flying service to Bar Harbor and the park from the great cities of our eastern seaboard has been instituted this year but not as yet developed. For hydroplanes the opportunity is great, with quiet waters at every hand for landing. For landing fields for airplanes the rugged nature of the country offers little opportunity, and use of these must wait till greater progress has been made in vertical descents and ascents.

EDUCATIONAL OPPORTUNITY

An important movement is taking place in the development of the region bordering the national park as a summer home for research workers along biologic lines, over 40 of whom, men of national and world-wide standing, have carried on their studies this summer as members or associates of the Mount Desert Island Biological Laboratory, established on its own land at Salisbury Cove on upper Frenchmans Bay. The president of the laboratory is Dr. Hermon C. Bumpus, a member of Secretary Wilbur's educational committee on national parks, who sees a most interesting opportunity here to carry out the Secretary's educational park policy.

VISITORS AT SIEUR DE MONTS SPRING AND THE INDIAN MUSEUM

Visitors in numbers greater than ever before have come to the Sieur de Monts Spring entrance, while the recorded visitation of the present season at the Indian Museum adjoining it, first opened a year ago last August, has exceeded 19,000 people.

A pamphlet written by the museum curator, Walter B. Smith, of Bangor, an archeologist, on the exploration made last season of a shell mound on the neighboring shore has been printed and is on distribution at a nominal price, its publication being made possible by the generosity of one of the trustees of the museum.

The total number of visitors to the park recorded for the year on October 1 was 149,554, an increase of 14,657 over the figure of a year ago.

ROADS, TRAILS, AND TELEPHONE LINES

There are within the park 7 miles of important motor road, 16 miles of carriage road, and 150 miles of foot trail. In the Schoodic Peninsula area of the park there are 4.8 miles of old carriage road roughly passable to motor use.

WILD LIFE

An accurate estimate of the number of wild animals within the park is impossible, but it is safe to say that the number of deer stands at about 150, ruffed grouse are many, and there is an indeterminate number of small fur-bearing animals—foxes, muskrats, skunks, mink, weasel, and otter.

BRYCE CANYON NATIONAL PARK

EIVIND T. SCOYEN, Superintendent, Springdale, Utah

ADMINISTRATION AND ORGANIZATION

Bryce Canyon National Park was established September 15, 1928, under authority of the acts of Congress approved June 7, 1924, and February 25, 1928. The first act provided for the creation of the Utah National Park upon certain conditions. Before these conditions were met the second act was passed changing the name to Bryce Canyon and doubling its area.

The effective date of the act was conditional upon the transfer of all private holdings in the park to the Government, and when these had been met the area was proclaimed a park on the date given above.

The past year has been our first year of operation in the park, and the area can hardly be called organized as yet. The superintendent, supervisor, chief ranger, and chief clerk of Zion Park also have appointments covering these positions in the Bryce organization.

During the summer two temporary rangers were on duty, one for general police work and the other acting in the capacity of ranger-naturalist. Labor was hired as needed.

WEATHER CONDITIONS

In common with the rest of the southwestern country, the park suffered from drought conditions. Temperatures were about normal.

On July 27 rainstorms of cloudburst proportions occurred in the vicinity of the park. Bus transportation was behind schedule and private motor travel practically stopped. The storm did thousands of dollars worth of damage to roads in the Sevier River Valley, which form the approach system to the park. This storm was followed by others and a flood at some point along the route was a daily occurrence for two weeks.

PARK TRAVEL

As this was the first year that travel records were kept for the park, there is no definite way in which to compare the 1929 records with those of previous years. However, it is believed that travel for other seasons was greatly exceeded.

The total number of visitors was 21,997, of which 17,211 came in 5,223 automobiles, 4,784 by stages of the Utah Parks Co., and 2 by miscellaneous means.

The following table shows the park travel, by months:

Month	By automobile		By stage (rail)	Miscel- laneous travel	Total visitors
	Cars	Passen- gers			
1929					
May.....	386	1,364	190	-----	1,554
June.....	1,320	3,300	1,063	2	4,365
July.....	1,379	4,853	1,438	-----	6,291
August.....	1,546	4,557	1,482	-----	6,039
September.....	601	3,135	611	-----	3,746
Total.....	5,223	17,211	4,784	2	21,997

Above are only months for which records are available.

During the year 5,600 people in 1,400 cars camped in the public auto camp.

PARK SERVICE ACTIVITIES

Construction.—After a somewhat late start, due to delay in getting plans for projects, work on all construction projects was rushed, and by October 1 all buildings and improvements had been completed with the exception of the custodian's residence, which was 75 per cent complete. There will be no projects carried over for construction next spring. The work in the park was supervised by Guy D. Edwards, assistant engineer, from the San Francisco office.

The following buildings were completed: Custodian's residence (75 per cent), two standard comfort stations built of logs, checking station, and two pit toilets.

In addition to the above the entire trail system in the canyon was rebuilt, including the horse and foot trails. Due to its relatively small size the canyon is an ideal place for the hiker.

Other improvements consisted of building of a water and sewer system on the public auto camp grounds and park administrative site.

Maintenance.—There was but little maintenance to be done in the park the past year. There is only about a mile of road in the area at present, and maintenance work on trails consisted for the most part of reconstruction under roads and trails allotments. The Government had no telephone lines or buildings to be taken care of. The only maintenance activity was on the public auto camp grounds.

Ranger activities.—Only two temporary rangers were in the park during the season. One of these handled general police work, looked after the camp grounds, traffic control, drove stock out of the park when trespassing, etc.

Educational work.—One of the above rangers gave the lecture each night at the lodge and conducted parties for short hikes along the rims. A total of 33 lectures was given, attended by 10,612 persons, and 5,653 park visitors availed themselves of the nature guide service.

Office work.—All work relating to the purchase of supplies and materials, disbursing, keeping of accounts, etc., for this park was handled in the office at Zion National Park.

Equipment purchased.—The following major items of equipment were purchased: One 1½-ton Chevrolet express truck, one small air compressor, and minor items.

PARK WILD LIFE

Very little is known regarding the wild life in the park. This will be the first year in which hunting will not be allowed in the area, but deer appear to be quite numerous as signs are frequently seen along the canyon rims.

There are numbers of smaller animals, such as chipmunks, ground squirrels, etc.

Predatory animals will probably never be a serious problem, as they are hunted energetically outside the park, and the area is too small to give refuge to many animals of any kind.

IMPROVEMENT OF APPROACH HIGHWAYS

This subject is covered thoroughly under this heading in the report for Zion National Park. The most important road from the Bryce standpoint is S. No. 89.

TOPOGRAPHIC MAP OF PARK

The United States Geological Survey did some work in establishing triangulation points and levels in this area, and I have been informed that they plan to start actual work of mapping next year. I also understand that they plan on doing most of the work from airplane photography.

IMPROVEMENT BY OPERATORS

The Utah Parks Co. built five additional cabins of the de luxe type containing four rooms with bath. They also installed two 150,000-gallon water storage tanks and made some extensive improvements to their springs where the entire Bryce Canyon supply comes from.

BOUNDARY EXTENSION

Considerable study was made of a possible adjustment of the park boundaries, especially to include lands for a distance of about 12 miles to the southwest. I went over this proposition with Forest Service officials and do not think there will be any difficulty in working out a logical boundary for the park. The breaks in the pink cliffs which form the main Bryce Canyon extend for a distance of about 25 miles in a southerly direction from the present park boundary. At least 12 miles of these breaks should be in the park. The main problem at present is to find the logical point for the boundary, considering the scenic values and topographic features.

CRATER LAKE NATIONAL PARK

E. C. SOLINSKY, Superintendent, Crater Lake, Oreg.

The past year in Crater Lake National Park has been very favorable in every respect. The travel has been the heaviest in the history of the park, showing an increase of 18.5 per cent over the 1928 season.

Our two main entrance roads, the west and south, were kept in excellent condition throughout the season and were by far the most popular routes of travel.

Among our distinguished visitors this season were Secretary Wilbur and party; Director Albright; President and Mrs. W. W. Campbell, of the University of California; and Dr. and Mrs. John C. Merriam, president of the Carnegie Institute.

WEATHER

Precipitation was subnormal. An early fall was characterized by exceptionally fine weather, which extended well into November before the heavy snows started. The park roads were closed by snow on November 13. The weather during May and the first half of June was extremely cold and stormy. While the total snowfall for the winter was subnormal, the cold spring retarded its recession and required considerable expense and labor to open our roads for the start of the season travel. During the tourist season, or from June 19 to September 1, the weather was ideal with almost continuous clear sunny days, ideal for outdoor recreation.

No accurate weather reports were kept in the park during the fall and winter, and it is therefore impossible to give the customary maximum and minimum readings and precipitation records.

TRAVEL IN 1929

Park visitors this year totaled 128,435 as compared with 108,350 last year, an increase of 18.5 per cent. This travel represented visitors from every State in the Union as well as several foreign countries. The stage travel figures were 1,074 as compared with 1,141 last year, showing a decrease of 6.2 per cent.

All auto travel records for previous seasons have been exceeded. A total of 115,322 auto visitors entered by the west and south gateways, 7,938 at the east, and 5,175 at the north; grand total all entrances, 128,435. The checking stations at the west and south entrances were moved and consolidated into one station, located at the junction of the two roads at Anna Springs. This proved highly efficient, requiring only a maximum of four rangers to handle the traffic which heretofore required six, thus releasing two rangers for other park duties at the rim and patrolling outlying districts of the park.

The number of people reported at our public campgrounds during the season is as follows: Rim, 2,825 cars and 8,028 people; Anna Springs, 287 cars and 967 people; Lost Creek, 165 cars and 454 people; a total of 3,277 cars and 9,449 people. In addition a number of campers used the camping places along our roads at White Horse, Cold Springs, and Sun Creek. No accurate count was kept of the campers at these locations.

Total season travel, by entrances, 1929 and 1928

Gateway	By automobile		By motor cycle		Stage	Other	Total
	Cars	Visitors	Vehicles	Visitors			
1929							
West and south.....	34, 872	113, 976	43	57	1, 074	215	115, 322
North.....	1, 536	5, 175					5, 175
East.....	2, 592	7, 938					7, 938
Total.....	39, 040	127, 089	43	57	1, 074	215	128, 435
1928							
West.....	13, 187	42, 997	25	31	361	133	43, 522
South.....	11, 249	37, 018	13	15	733	68	37, 834
Anna Springs.....	5, 220	15, 211	4	6	47	6	15, 270
North.....	1, 454	4, 739				5	4, 744
East.....	2, 256	6, 973	6	7			6, 980
Total.....	33, 366	106, 938	48	59	1, 141	212	108, 350

ADMINISTRATIVE DEPARTMENT

Headquarters office.—During the fiscal year from two to five clerks were employed in the headquarters office on general office work, correspondence, financial matters, information, time keeping, and other office duties.

Appropriations.—For the fiscal year 1928 the park operated under an appropriation of \$45,400, of which \$9,420 was devoted to new construction and the balance, or \$35,980, to general operation and maintenance. In addition to these general park funds, \$600 was transferred to this park from Yosemite and \$1,020 was appropriated to cover the Welch Act salary increases. From other park appropriations, \$13,400 was made available for pine beetle control work. Under "Roads and trails," \$20,000 was allotted this park and expended under supervision of Bureau of Public Roads. In addition, \$64,800 was allotted and expended under National Park Service roads and trails funds.

For the fiscal year 1929 the park operated under an appropriation of \$56,765, of which \$16,595 was devoted to new construction. In addition to these park funds, \$6,400 was allotted to this park from National Park Service roads and trails funds and \$7,000 was allotted from other park appropriations for pine beetle control work.

Revenues.—Revenues collected during the year ending June 30, 1928 and deposited in the general fund of the Treasury were as follows:

Auto and motor cycle permits-----	\$23, 932. 00
Studio-----	383. 22
Total-----	\$24, 315. 22

ENGINEERING DEPARTMENT

This department is in charge of Engineer Ward P. Webber, connected with the field headquarters office, San Francisco, and loaned to this park during the travel season.

Road maintenance.—Due to the lack of proper equipment, maintenance work was held to a minimum, with the result that all of our roads, with the exception of about 22 miles of pavement, were in very poor condition. The soil in this vicinity is principally a dry pumice ash and makes an extremely poor road-bed, with the result that our roads become very dusty and rough and are very disagreeable to travel over. This is particularly true of the Rim Road.

Snow removal.—There is no mechanical snow removal equipment in this park, and it becomes necessary each spring to expend considerable sums for labor to clear our roads of snow in time for the opening date. The roads of the park were opened this season on the following dates: Klamath-Medford Loop, June 12; Anna Springs to rim, June 22; east entrance, June 24; north entrance, July 6; Rim Road, July 13.

Road improvement.—The east entrance road from its connection with the Dalles-California Highway to the park entrance, a distance of approximately 5 miles, was reconstructed and surfaced with crushed rock. This road was also improved in a like manner for a distance of 1.9 miles within the park boundary.

The pavement on the Government camp Rim Road had to be torn up, reprocessed, and relaid. This was due to improper mixing last fall during the cold weather. A crew of three men were employed during August in repairing and patching holes in the paved park roads.

The new Crater Wall Trail, leading from the rim to the water's edge, was completed and opened to travel on July 6. It so happened that Secretary Wilbur's party arrived in the park on this day and the Secretary led a party on horseback down the trail to the lake. This was the first party ever to descend to the lake on horseback.

Buildings.—The old ranger station at Anna Springs was torn down and removed. The interiors of the new employees' residences at Government camp were painted. A new checking kiosk was constructed at Anna Springs. The combination bunk and mess house was completed at Government camp. This building replaces an old log structure and with the removal of this building from its present site, it will add a vast improvement to the landscape and efficiency of Government camp. The new sewage disposal system at Government camp is being installed and is practically completed. Authority was granted allowing the construction of the ranger station at the north entrance instead of at the rim, as called for under the appropriation act. This change of location is desirable on account of the possibility of locating the new ad-

ministration building at the rim, in which event a ranger station there would not be necessary. This building is now under construction and will be completed before the heavy snows set in. The new rim comfort station is about complete.

LANDSCAPE DEPARTMENT

Landscape Engineers Vint and Wosky visited the park during the year to select locations for buildings, advise on matters relating to roadside clean-up and rim area planting, etc.

Fifteen hundred dollars was allotted this park for roadside clean-up. This work was confined to areas along the Anna Springs-Government camp road. About 1 mile of this road was cleaned up. This work will have to be continued for several seasons to complete, unless larger appropriations are granted. The rim area was cleaned up of debris and trash, resulting from road and trail construction, under direction of Landscape Engineer Davidson. Some planting was done to eliminate the dust.

On account of inadequate water supply, the planting of this whole area will have to be postponed until such time as sufficient water storage can be provided.

SANITATION DEPARTMENT

This department was handled by a crew of four men and a light truck. The camp grounds were kept clean and sanitary. All garbage and refuse from camps and hotels were disposed of daily. Sanitary Engineer Hommon visited the park and inspected the various camps and hotels and found them clean and satisfactory, from a sanitary standpoint.

PROTECTION DEPARTMENT

The permanent personnel of this department consists of Chief Ranger W. C. Godfrey. Ten temporary park rangers were added during the season and regular patrols of our park roads were made. Information, guide, and lecture service, compilation of travel statistics, communications and camp ground services, checking entrance travel, and a wide range of other duties were carried on by the ranger department for the convenience and pleasure of park visitors.

Forest fires.—There were no forest fires of importance during the season. A total of 8 small fires were extinguished by park rangers without damage to park property.

Fish.—Fishing on the lake was exceptionally good this season. A great number of fish over 20 inches in length were caught and many limit catches reported. The fish seem to be in good condition and offered excellent sport for the angler. Several thousand small fish will be planted this fall. They are now available at the Klamath hatchery but are being held there as long as possible in order that they may reach the maximum growth before planting.

Insect control.—An extensive program of control work against the invasion of pine beetles was carried on during the period from May 17 to July 8. A total of 23,239 trees was treated at a total expense of \$17,058.91. About 3,000 infested trees were left untreated and the broods emerged to surrounding timber. It is planned, in order to check this invasion, to continue the control work this fall with the balance of the funds left in this allotment.

ANIMALS

Our wild life did exceedingly well this year because of favorable weather and forage conditions, which have been exceptionally good throughout the park. The bears, our most attractive animals, created considerable interest among the visitors and were seen at all centers of habitation. Deer were seen in practically every part of the park during the year, and indications point to a considerable increase in number. One herd of five elk was noticed in the southern part of the park. Signs of the predatory animals, such as cougar, wolf, and coyote, show the presence of these animals in comparatively large numbers. One wolf was seen on the north rim, while a number of coyotes were reported as seen in various sections of the park. Small animal life such as marmot, ground squirrels, chipmunk, and conies was seen in great numbers. Occasionally pine martins were reported, showing the existence of this animal in the park.

Bird life was much in evidence. The most common species were camp robbers, bluejays, Clark's crows, nut latches, juncos, robins, finches, hawks, ravens, and humming birds. Eagles were seen about Wizard Island on numerous occasions.

INFORMATION

This department was in charge of Acting Park Naturalist Earl U. Homuth, assisted by one temporary ranger naturalist and two volunteer assistants. About 65,000 free Government publications were distributed at the information office and temporary museum and ranger stations during the year.

Lecture service.—This service consisted of 2 lectures each evening during the season, 1 at the temporary museum and the other at the lodge. A total of 93 lectures was given; the total attendance was 11,020.

Guide service.—One regular guide party was conducted daily over areas about the rim. A total of 50 field trips was made during the season and the total attendance was 1,234.

Wild flower garden.—A natural wild flower garden was established near Government camp. In this garden approximately 200 species of park flowers may be found growing under natural conditions. This garden created a great deal of interest among the visitors and regularly conducted trips were made through it.

ELECTRICAL DEPARTMENT

Telephone system.—The park telephone system was kept in good repair and provided good service. Our outside connections, however, caused a lot of trouble and gave very poor service.

MECHANICAL DEPARTMENT

Under direction of our master mechanic trucks, passenger-carrying vehicles, and equipment were overhauled during the late fall and winter months. This park is sadly lacking in proper equipment with which to carry on our various activities. With the exception of two, all of our trucks came from war surplus stock and have long since outlived their usefulness. They are a continued source of trouble and expense, creating exorbitant cost in our various projects. It is hoped that in the near future suitable equipment may be provided.

IMPROVEMENTS BY PUBLIC UTILITIES

Crater Lake National Park Co.—The new cafeteria was opened on July 20 and has shown a very satisfactory volume of business ever since. The prices charged are reasonable and no complaints have been received from the patrons. A group of 15 housekeeping cabins was opened on July 15, being kept filled to capacity practically every night.

Lodge.—A veranda, on the lake side, was added with awning covering and proved to be very popular with the visitors.

Boats.—A new 35-passenger launch has been added and has been in constant use since the opening of the season.

Saddle horses.—For the first time in the history of the park, saddle horses were available for rental by the visitor. This business was not altogether satisfactory this season, due to the fact that there were no defined bridle paths or routes where horses could be ridden with safety. It is contemplated to improve this condition next season by the construction of suitable bridle paths.

FRANCHISES AND PERMITS

Kiser's, Incorporated, photographic studio, was operated by the stockholders of the company this season. This concession expires on December 31, 1929. Renewal of franchise is not sought by present operators. Applications for studio franchise have been made by Fred H. Kiser and the Bear Film Co.

UNITED STATES COMMISSIONER'S COURT

Hon. Wm. Gladstone Steel, commissioner, presided. During the season no cases were brought to the attention of the court.

MEDICAL SERVICE

Dr. R. E. Greene, of Medford, handled all our medical cases. Eleven minor and 23 major cases were cared for.

GENERAL GRANT NATIONAL PARK

JOHN R. WHITE, Acting Superintendent, Sequoia National Park, Calif.
GUY HOPPING, Chief Ranger in Charge

The travel year of 1929 has shown a decrease in use of the park by visitors, due partly to a late spring following a heavy winter as compared to that of last year and partly to the lack of local travel owing to unfavorable financial conditions in the valley towns. The limited improvements that it was possible to make in the roads have been favorably commented upon by the majority of visitors, and the hope expressed that increased appropriations in the future will make possible a continuation of the good work.

Heavier snowfall than for some seasons past characterized the season of 1928-29, causing blocked roads at a late date in the spring. A fall of 37 inches in less than 4 days occurred in April, bringing the level at the gage to 6.2 feet, the highest point of the season. Cold weather, with fog at times, seriously affected later spring use of the park by the public.

PROTECTION

Owing to the transfer of ranger funds for needed equipment, three temporary rangers handled as many different stations, including nature-guide and information work at headquarters. Proper patrols were impossible, the one permanent ranger being fully occupied on the relief schedule necessary to afford checking and information rangers the necessary time for two of the three meal hours per day, and for conduct of the headquarters information bureau during absences of the information and naturalist ranger upon educational hikes with visitors. Fortunately, however, aside from the effect upon travel figures of insufficient checking force, lack of personnel has resulted in few complaints, and a fine spirit of cooperation has generally been shown by campers and other visitors. The one fire threatening the park from within was extinguished by campers before being reported. A serious mutilation of a big tree was discovered with no clue to the offenders.

RANGER-NATURALIST SERVICE

A start made this season in developing a ranger-naturalist service under the direction of Temporary Ranger B. E. Jamison, a prominent educator of Porterville, Calif., has proved to be of great interest and value to visitors. While daily trips have not always been possible, owing to limited time and the necessity of scouting in advance, at times, in preparation for the work, 1052 persons were taken upon 35 trips during the period from July 1, 1929, to September 1, 1929. Press of station work made it necessary to limit the hours for the nature-study activities to two per day. Under these conditions it was impossible to properly cover the ground on the longer trips, but results were, nevertheless, very encouraging. It is hoped that another season will afford adequate ranger personnel to enable this ranger to devote more time to this important work.

MUSEUM

Although the small size of the present administration building offered small inducement for further crowding, housing as it does the chief ranger's and information offices and the post office, the largest of the four rooms was devoted to use as a museum this season. Three rows of slanting shelving have been installed on all available wall space and a large glass-covered case placed in the middle of the floor for display of entomological specimens native to the region. Forty-six excellent mounts of local plant and forest life are on display, with various other specimens of natural features of the park. While space for visitors is decidedly limited, this small attempt at a park museum has been well patronized, with keen interest shown by visitors.

PHYSICAL IMPROVEMENTS

Within the park area of approximately 4 square miles, or 2,536 acres, are found the following:

Roads, 16.1 miles; trails, 13 miles; telephone lines, 5.5 miles; sewer lines, 2 miles; water lines, 7.5 miles; buildings, 4; comfort stations with flush toilets, 6, exclusive of 2 on lodge grounds; pit toilets, 20; camp grounds, 5; camping sites, 450; small lighting unit supplying grounds and buildings at administrative and industrial areas and community camp-fire unit.

PARK ROADS

Although neither funds nor equipment were available for other than moderate maintenance and minor improvements to park roads, a total of 16.1 miles was in usable condition by the end of the season. Roads are classified as primary or main-traveled roads—10.3 miles in all—and secondary roads used for service and emergency and by visitors driving light cars, who may wish to explore the less-known parts of the park. The total of this class includes in excess of a mile of long-abandoned grades which have been opened for these uses and which combine with these desirable opportunities for extended hiking or saddle trips, facilities for which have been urgently demanded by visitors and utility operators alike. An outstanding feature of this program has been the improvement of the Rocking Rock Road to the point of view, excelled by few in the Sierra, covering the Kings River and the Tehipite gorges.

KINGS RIVER ROAD

Heavy going is reported by the engineer in charge, the shovel working north from the park boundary being still in heavy rock formation and the shovel working to meet it from the camp at Indian Basin being still about 6 miles distant by the line of survey. Much preliminary work has been done in the intermediate section, however, and progress is not unsatisfactory, considering the character of the country. Facts given are at time of writing, August 28.

PARK TRAILS

The allotment of \$150 for trail maintenance and improvement for the past season was, of course, entirely inadequate to even make passable more than a small part of the neglected trails of the park, but an effort has been made to improve conditions, and a small but efficient crew has succeeded in brushing out and, in some cases, practically rebuilding the grades of almost a mile of trail, nearly half of which was almost entirely obliterated. Sunset Rock is now reached by easy grade from the parking ground at headquarters. The other work noted has opened out an interesting section of the northern part of the park, practically unknown to visitors for several years, and serves as a beginning in development of long-needed facilities for hiking and saddle trips.

WILD LIFE

Deer in the park are estimated to number 150, but at time of writing are being harassed by two large lions, which have killed several of the animals near the water tanks and at other points near the inhabited parts of the park. The does and fawns near headquarters are noticeably nervous and less tame than usual.

The newly created State game refuge surrounding Grant Park, with boundaries at distances varying from a mile to two or more from the park, is expected to be of great benefit to the animals, and should permit of their becoming really tame at camp centers.

FIRE PREVENTION

Under the allotment for this purpose work has been concentrated upon a fire break protecting the northern boundary from the hazard occasioned by operations upon the Kings River Highway (State) in adjoining territory and upon similar breaks at or near the south boundary, always a dangerous area. At time of writing the northern break, 20 feet wide and 5,300 feet in length, has been completed, and it is estimated that by the close of the season approximately a mile of the southern clearing, of the same width, will be ready for service. Natural breaks in the form of rock dikes have been used wherever possible, and approximately 1,800 feet of this class of protection is found upon the two fronts, the balance being mainly heavy brush and timber thickets with occasional clearings, requiring comparatively light work to complete.

INSECT INFESTATION

Ravages of the bark beetle are to be noticed in some sections of the park, and a survey upon which to base recommendations will be made as soon as press of other work will permit.

THE NATION'S CHRISTMAS TREE

Ceremonies first held at the foot of the General Grant tree on Christmas Day of 1925 have been an annual event since, and this year, although road conditions were unfavorable and the weather rainy that morning, the exercises were attended by 130 persons, most of whom hiked over the partially cleared road from headquarters to the Grant Grove, a distance of a mile. Adequate clearing of snow from approach and park roads would undoubtedly develop for this event a nation-wide attendance recruited from the large numbers of winter visitors to the State.

PAGEANT

Another outstanding holiday event, destined to become of increasing importance, was inaugurated this year by the presentation July 4 of "An Epic of the Sequoias," a pageant the text of which was written for Grant Park by Mrs. Amy Parrish. The attendance in the park on this occasion is estimated at 3,500 persons. The presentation, intended to become an annual event in the park, was sponsored by the Association of Fresno County Chambers of Commerce, whose wish it is to concentrate at Grant Park and Sequoia Lake the Independence Day celebrations for all parts of the San Joaquin Valley, with the pageant, further expanded from year to year, forming the main educational feature of the day's program.

GLACIER NATIONAL PARK

J. ROSS EAKIN, Superintendent, Belton, Mont.

GENERAL STATEMENT

A forest fire for which the park organization was in no way responsible marred what was, until August 21, the most successful season by far the park has ever enjoyed. A fire broke out in slashings on privately owned lands 10 miles from the park, and, under a high southwest wind continuing for 5 days, entered the park on the above date. It was a crown fire of the most destructive type and beyond human agency to stop. The crown fire missed park headquarters by about one-half mile and traveled just to the south of Apgar. A number of buildings at Apgar were burned and 2 miles of shore line of Lake McDonald were ruined. Fifty thousand acres of forest in the park, 10,000 acres of which were old burns and upon which reproduction had started, were destroyed. Thus the excellent work of our fire organization which detected and suppressed 39 fires, the largest of which burned 4 acres, was largely undone. Owing to the great loss, we can secure only small consolation in the fact that much more forest would have been burned had not our fire organization functioned so efficiently both before and after this great disaster overtook us. John D. Coffman, fire control expert, National Park Service, arrived on August 22 and took immediate charge. He faced a most discouraging situation with fire out of control on both sides of Lake McDonald, and the North and Middle Forks of Flathead River, but made the most of it. Without his guidance far more forest would have been lost.

In educational activities, a fire detection and suppression organization which would have kept fire out of the park except in an extremely abnormal year, in fish propagation, in road and trail construction, and maintenance and camp ground improvements, much progress was made.

The great increase in travel, even with unfavorable publicity concerning fires, is gratifying.

The appointment of a permanent park naturalist to Glacier gave a fresh impetus to our educational work, which had been at a standstill for several years. The increase in the efficiency of our educational organization over previous years is easily 100 per cent.

Seasonal activities such as opening roads and trails, etc., were greatly facilitated by the preceding winter of mild weather and light snowfall.

WEATHER

The weather was unusually mild during this year. There was no snowfall whatever during November, 1928, and only 1½ inches snowfall during December. The snowfall and precipitation during the entire winter amounted to about half of that of a normal winter. During the summer of 1929 the weather was

ideal for tourist travel, with dry, warm days and cool nights, although roads and trails were dusty. Smoke from fires outside the park caused poor visibility from August 1 to 21, when smoke from fires in the park made visibility much less.

TRAVEL

The number of visitors entering Glacier National Park by all modes of travel during the past year is an increase of 32.3 per cent over the number visiting the park last year. There was an increase of 7.7 per cent in rail travel and 46.1 per cent in motor travel over last year.

Travel by entrances

Entrance	Private automobile		Private motor cycles		Saddle horse, team, and foot	Stages (rail)	Boats	Total
	Cars	People	Motors	People				
Belton.....	6,569	23,037	5	5	55			23,097
Polebridge.....	265	783			3			786
Two Medicine.....	2,975	10,049	4	4	18			10,071
St. Mary.....	1,688	5,588	1	2	53			5,643
Sherburne.....	2,486	8,308	2	3	32			8,343
Waterton.....					412		5,834	6,246
Belly River.....					166			166
Bus, west side.....						836		836
Bus, east side.....						13,914		13,914
Out of season travel.....	325	1,640						
Total, season.....	14,308	49,405	12	14	739	14,750	5,834	70,742

Visitors this season.....	69,102
Visitors last season.....	52,606
Increase this year.....	16,496
Automobiles this season.....	13,983
Automobiles last season.....	9,588
Increase this year.....	4,395
Motor cycles this year.....	12
Motor cycles last year.....	12
Visitors by automobile this season.....	47,765
Visitors by automobile last season.....	32,936
Increase this year.....	14,829
Visitors by motor cycle this year.....	14
Visitors by motor cycle last year.....	21
Decrease this year.....	7
Visitors by rail this year.....	14,750
Visitors by rail last year.....	13,686
Increase this year.....	1,064
Visitors by boat, saddle horse, and foot this year.....	6,573
Visitors by boat, saddle horse, and foot last year.....	5,963
Increase this year.....	610
Camp grounds this year (cars).....	2,992
Camp grounds last year (cars).....	2,298
Increase this year (cars).....	694
Camp grounds this year (people).....	9,937
Camp grounds last year (people).....	7,347
Increase this year (people).....	2,590

CAMP GROUNDS

The Avalanche camp ground was enlarged and roads cut throughout its area. The main roads within the camp ground were graveled. A water system and two comfort stations were installed.

The public camp grounds in Glacier National Park were used to a greater extent this year than ever before in the history of the park. All the camp grounds were used to capacity this season, although none of them has been overcrowded. Numbers of automobile tourists have wanted to camp at the end of the Transmountain Highway at the summit of Logan Pass. No camping facilities were provided there this year, but it may be necessary to provide a small camp ground at this place next year. At this time two pit toilets and receptacles for garbage have been provided at this point and a fence built to confine cars to a designated parking area.

Our camp ground registration figures for this season show that the camp grounds in Glacier accommodated 2,992 cars and 9,937 people, an increase of 35.2 per cent over last year, for number of people.

It is estimated that the completion of the Roosevelt Highway, along our southern boundary, will increase automobile travel to this park by at least 50 per cent. This highway will be finished and opened to travel by July 1, 1930. The completion of this highway will not only increase the automobile traffic through all of our present automobile camp grounds, but will perhaps necessitate the construction of an additional camp ground in the southern portion of the park where the highway enters and traverses several miles of park land.

ROADS

All road construction in Glacier National Park is directly supervised by the Bureau of Public Roads. The following work was accomplished by that bureau during the past year:

The Babb-Many Glacier Road, built under contract with T. M. Lawler, was finished and accepted by the Bureau of Public Roads on October 29, 1928, and turned over to Glacier National Park for maintenance. Numerous slides occurred on this new piece of road during the winter and spring, and this office recommended that an allotment of \$8,000 be set up from the appropriation "Roads and trails, national parks, no year," for the purpose of removing slides and bringing shrinking embankments up to grade. However, no money could be made available for this work, and since our regular maintenance fund was not adequate to perform this additional work, it has been necessary to leave this road in very poor condition during the summer. An attempt has been made to keep drainage ditches open and the surface smooth for travel, but no slides have been removed and can not be removed until money and equipment are available for the work.

The contract for the completion of the Two Medicine Road was let during the summer of 1928 to T. M. Lawler. The entire job was roughed out during the summer and fall of 1928. In the spring of 1929 the road was fine graded and surfaced, the contract being completed by July 20, 1929, except the bridge approaches, the completion of which was delayed on account of the Trick Falls bridge not being completed. This was a very well constructed job and finished in good shape.

All of the new Blackfeet Highway, except that portion over the Two Medicine Ridge, was completed and turned over to the park during the fall of 1928. That part of it over Two Medicine Ridge was not completed until August 26, 1929.

Contracts for the construction of two bridges on the Two Medicine Road were let during the fall of 1928 to Sam Boudrye. The work on these bridges progressed very slowly on account of suitable stone for arch work not being available in the vicinity of the bridge sites. In the spring of 1929 a quarry was located near Belton and the rock shipped to Glacier Park and the bridges were completed early in September, 1929.

Bids were opened on August 16, 1929, for the construction of the bridge across Swiftcurrent Creek near the Many Glacier Hotel. All bids were excessive and were rejected. The Bureau of Public Roads will build bridge piers by day labor. The parking loop at St. Mary's Chalets was graveled during this season.

Road maintenance work began in Glacier National Park on May 1, 1929. Although the season has been very dry, the roads have been kept in better shape than ever before. A three-quarter-yard capacity gasoline shovel was purchased and used on the removal of slides on the Transmountain Road between Apgar and the summit of Logan Pass. This work was started about the middle of May and continued throughout the summer. Three weeks were

consumed in snow removal from the higher portions of this highway in order to have the road open for travel by June 15. The balance of the time was spent in removing slides of dirt and rock, cleaning ditches, etc. The material removed was hauled to widen fills and short stretches where water had washed holes in the new grade.

In order to open road to Logan Pass for travel it was necessary to remove 1,500 yards of rock, 2,500 yards of dirt, and 25,000 yards of snow slides.

One maintenance crew has been kept on the North Fork Road, with the object of keeping it passable for trucks for fire protection purposes. This road has been in better shape during the past summer than it has been for the past five years.

TRAILS

The high-line trail from Granite Park to Flattop Mountain was completed during the year. It lies, for the most part, far above timber line and is at this time the most scenic trail in the park. Construction of the continuation of this trail from Flattop Mountain to Waterton Lake was begun on August 3, 1929. Every effort will be made to complete the Flattop-Waterton Trail before the end of the present season.

Construction of the new horse trail to Grinnell Glacier was completed on August 25, 1929.

The reconstruction of the Swiftcurrent Trail was completed during the summer of 1929.

The footpath around Swiftcurrent Lake was graveled, as was also the footpath from Josephine Lake to Grinnell Lake.

A new horse trail was constructed back of the ranger station and the Glacier Park Hotel Co.'s store at Many Glacier for the purpose of taking horse travel off the road. This trail, about one-half mile in length, was urgently needed.

On June 27, 1929, construction was started on the new Ptarmigan Wall Trail. This trail will connect the Swiftcurrent and Belly River Valleys across the Ptarmigan Wall. On July 31 a second crew was put to work on this project. The construction of this trail will involve the driving of a 200-foot tunnel. The trail will be completed this season with the exception of the tunnel and the ledge work on the north side of the Ptarmigan Wall. It will shorten the distance between Many Glacier and the Belly River Country by about 8 miles, and will be a wonderfully scenic trail.

The Eagle Scout Trail along the south shore of St. Mary Lake was continued for a distance of 3,800 feet during the summer of 1928 and for approximately the same distance during the summer of 1929.

All trails being constructed are at least $3\frac{1}{2}$ feet wide with a maximum grade of 15 per cent.

Very little difficulty was experienced in opening the trails for travel by the beginning of the park travel season. The snowfall during the past winter was below normal and the work of shoveling snow from portions of the high trails was greatly reduced.

The trail connecting the Nyack Valley with the Two Medicine Valley through Dawson Pass across the Continental Divide was opened for horse travel again this year. Also the trail connecting the Nyack Valley and the Red Eagle Valley via Red Eagle Pass was opened for horse travel for the first time in many years. These trails are not used by tourists but are very important for fire protection.

Bridges for hikers have been constructed across all streams on the route of the North Circle Trip. There was also constructed a trail bridge over the outlet of Lower Kennedy Lake.

The greater part of the heavy trail maintenance was expended in the Many Glacier, St. Mary, and Lake McDonald districts, which are the main travelled districts in the park. Minor repairs were made on fire and boundary trails by the fire-protection organization and the range force.

BUILDINGS

Construction of several new buildings, of which the park was very much in need, was accomplished during the year. One new residence for park employees and one for the United States commissioner were completed during the summer of 1929 at administrative headquarters.

Three fire lookout buildings were constructed—1 on Apgar Mountain near park headquarters; 1 on Loneman Mountain, in the southern portion of the

park, about 7 miles northeast of Nyack ranger station; and 1 on Mount Brown near the head of Lake McDonald. Unfortunately the disastrous forest fire burned the two former lookout buildings and they must be replaced.

Other buildings constructed during the year were a new snow-shoe cabin across the river from the town of Walton, situated where the Roosevelt Highway enters the park, one ranger-station barn, one new fire-tool cache at St. Mary. An emergency reallocation was authorized for the purpose of building a road maintenance camp mess house on the Transmountain Road. On this section of road the bears were so numerous and tame that the use of a tent for a cook and mess house was not practicable. A reallocation of funds was authorized in June, 1929, for the construction of a powder house.

Two of the residence buildings at park headquarters were raised and concrete foundations and small cellars were constructed under them. The roofs of four dwellings and the administration building at park headquarters were given a coat of paint. Five woodsheds at park headquarters and the Logging Creek and North Fork ranger stations were reroofed with shakes. Minor repairs were made to practically all of the park's 160 buildings.

The following new buildings, to replace buildings destroyed by the fire at park headquarters in August, 1928, were completed during November: Barn, 1 employee's residence, 1 fire cache, and 1 ice house.

EDUCATIONAL ACTIVITIES

The permanent park naturalist, appointed to Glacier during the year, reported for duty at park headquarters during the first week in May, 1929.

The publication of a monthly periodical, *Nature Notes of Glacier National Park*, was immediately initiated by him and approximately 1,000 copies of this publication have been prepared each month and mailed to interested organizations and individuals.

A plan of administration of educational activities for Glacier National Park was prepared by the chief naturalist and the park naturalist and was officially accepted by the service. It has been the guide for educational service in Glacier since its preparation.

The first issue of a manual of information and instruction for the educational staff was revised and 25 mimeographed copies prepared.

Information service, flower shows, self-guiding trails, daily lectures, and twice-daily field trips have been regularly maintained at Many Glacier Hotel, Going-to-the-Sun Chalets, and Lewis's Glacier Hotel during the travel season. Three special parties of visitors, totaling 41 people, were sent into the park from the East by the American Nature Association, publishers of *Nature Magazine*. These parties were accompanied by a ranger-naturalist on their tour from Many Glacier to Lewis's Hotel via Granite Park Chalets, Going-to-the-Sun Chalets, and Sperry Chalets. A party from a Kentucky State teachers' college was also given special attention.

During the travel season 376 field trips were conducted by the educational staff, which were attended by a total of 5,902 people; 202 lectures were also given and were attended by 14,746 people. Lectures and field trips served a total of 20,648 people.

A survey of insect-infested white pine near park headquarters and in the Lake McDonald district was made by operatives of the Bureau of Plant Industry and Bureau of Entomology. This timber is badly infested with the larvæ of the white pine bark borer (*Dendroctonus monticolæ*). It is the opinion of these operatives that the white pine in the McDonald district is doomed unless prompt and drastic steps are taken to eradicate the insect infesting it. Most of the white-pine timber in the Mineral Creek Valley, the best stand of white pine in the park, has already been killed.

The Bureau of Plant Industry also investigated forests in other parts of the park, particularly the Many Glacier region.

Dr. W. W. Atwood, president of Clark University, a member of the educational committee appointed by the Secretary of the Interior, was in the park two weeks making a study of its educational needs.

TELEPHONES

Five miles of new telephone line were built from a point near Lewis's Glacier Hotel to the fire lookout station established on Mount Brown this year.

FISH PROPAGATION

During the past year a great stride forward was made by Glacier in the propagation of fish in park waters. Fish racks and traps were installed in Apgar and Fish Creeks on the west side of the park and spawn taken for the hatchery at Glacier Park station. During the coming year spawn will also be taken from Logging Lake and other waters for hatching and planting in park waters. It is planned to make the park self-supporting as far as fish spawn is concerned. Eight rearing ponds were constructed this year for use in conjunction with the hatchery at Glacier Park. These ponds were built by the park in cooperation with Bureau of Fisheries and Glacier Park Hotel Co. Fry are placed in these ponds and reared to fingerling size before planting. This method insures the survival to maturity of a much greater percentage of the number planted than the methods of planting eyed eggs or small fry. During the year there were more than 2,000,000 fish planted in park waters, including cutthroat, rainbow, eastern brook, and golden trout. Twenty-one thousand fry were given to the adjacent Lewis and Clark National Forest for planting.

Estimates for 1931 contain an item for 8 rearing ponds and a water supply line at Fish Creek. The Bureau of Fisheries plans to install a hatchery in an old building at this point.

ANIMALS

The winter of 1928-29 was a very easy one on all grazing and browsing wild life. The temperature, on an average, was exceptionally mild and the snowfall below normal. All wild life came through the winter in excellent shape, and the increase of each species was greater than usual, especially the increase in deer, elk, mountain sheep, and mountain goats.

During the winter only about half of the deer and elk on the west side of the park came in to the usual winter feed yards, the balance remaining on the fall and early winter ranges. Approximately half of the usual amount of hay was fed to deer and elk on the west side. However, it was necessary to feed the elk at St. Mary and the sheep at Many Glacier their full quota of hay, inasmuch as there is no winter range for them on the east side. The east side at this time functions very poorly as a game preserve. There is no winter range for deer, elk, and sheep, and they must be fed hay during each winter to keep them from seeking winter pasture outside the park. They are killed by Indians when they cross the park boundary into the Blackfeet Reservation. Steps should be taken to extend the boundary eastward far enough to provide adequate winter range for our game on the east side.

No game count was taken this year. Due to the mild weather the animals stayed scattered instead of collecting in winter yards, and it was impossible to get even a close estimate of the numbers of elk and deer on the west side. It is estimated that the sheep fed during the winter at Many Glacier increased by about 30 per cent. This is the first year for a decade that there has been a noticeably large lamb crop. Last winter the flock at Many Glacier numbered about 65 sheep. During the coming winter it should number at least 85. Rangers report an unusual number of kids among the mountain goats.

ARRESTS

During the year 17 complaints were filed, involving 16 defendants. In each case a conviction was secured before the United States commissioner, the fines aggregating \$212. One defendant was found guilty of possession of firearms and the killing of wild animals in the park; the sentence in this case was \$125 fine and 30 days in jail. One defendant was arraigned on a charge of possessing and transporting liquor and was bound over to district court on \$300 bond. The balance of the cases were speed-regulation violations, with one case of disorderly conduct, and the fines ranged from \$1 to \$25 each.

ACCIDENTS

During the year only one serious accident occurred. A park visitor was thrown from his horse and his clothing caught on the saddle. He was seriously injured by being trampled by the horse before he could be extricated. Only four other minor accidents affecting park visitors occurred, all in connection with saddle-horse transportation. The above speaks well for the care with which the saddle-horse company and the transport company handle park visitors.

FIRE PROTECTION

Our fire detection and suppression organization was worked out this year under the supervision of Fire Control Expert J. D. Coffman. A training school was held in Glacier National Park under his immediate supervision for the purpose of instructing fire lookouts, fire guards, and park rangers in the technique of fire prevention and fire fighting. Officials of the neighboring Flathead and Blackfoot National Forests cooperated with the park in giving this course of instruction to park personnel and an excellent course of instruction was given.

Two new fire lookout stations were added to our system this season, one on Mount Brown, at the head of Lake McDonald, and one on Loneman Mountain, about 7 miles northeast of the Nyack ranger station, making 5 lookouts in all. Three modern lookout houses replacing tents were built, but unfortunately 2 of them were burned.

Our fire prevention and suppression organization functioned with the utmost efficiency until disaster overtook us. Twenty-nine fires within the park boundaries and 11 fires outside the park were detected and suppressed by our organization during the past summer. This season has been very dry and the fire hazard great, and an accurate idea of the excellent work performed by our fire prevention organization in promptly detecting and suppressing fires may be gathered from the fact that of the 40 forest fires fought, the largest, with the exception of the great fire on the Belton side referred to in the opening of this report, attained a size of about 4 acres, the next largest about one-quarter acre, and the balance were nothing more than large or small spot fires. In addition to the above, our lookout system, in cooperation with adjacent national forest organizations, reported 23 fires on national forest lands.

RECOMMENDATIONS

Our fire-prevention organization has rendered excellent service during this fire season. It is handicapped, however, by lack of transportation equipment. At park headquarters the only heavy truck available for the exclusive use of the fire-prevention organization consists of one obsolete three-quarter-ton G. M. C. truck. A three-quarter-ton truck has approximately one-third the capacity needed in a fire truck. To carry a minimum crew of 10 men, together with necessary tools, pumps, hose, etc., requires a vehicle of at least 2 tons' carrying capacity. The only vehicle available on the east side for the exclusive use of the fire-prevention organization is an old model Ford 1-ton truck, which is absolutely inadequate both in speed and carrying capacity. Additional personnel is also needed. The recommendations of Fire Control Expert J. D. Coffman, contained in our regular annual estimate and in a supplemental estimate for the fiscal year 1931, provide for equipment and personnel to remedy the present situation, and his recommendations should be followed in their entirety. Certain weaknesses such as too much elapsed time in reaching fires in certain areas, etc., have been noted and recommendations have been included in estimates for 1931 to correct them. A further study of the fire needs of the park should be made.

Remarkable progress was made during the past year with the educational work in the park. There is no line of activity in the Park Service of more importance than this work of interpreting the park to visitors. This activity has been at a standstill for many years past in Glacier and the progress made this year is merely a start in the right direction, which will be of only slight benefit unless provision is made for further progress to meet the increasing demand by the public for this service.

One of Glacier's major attractions is its trout fishing. Up to this year no facilities for harvesting fish spawn from park waters have been provided, and we have been wholly dependent on outside agencies for spawn to restock our streams and lakes. Naturally these outside agencies have given Glacier only what spawn, fry, etc., that could be spared after their own needs were cared for, and it has been impossible to secure sufficient spawn for hatching and planting to replace the fish taken by anglers from park waters each year. Consequently the waters in Glacier National Park have become somewhat depleted of fish and the excellent fishing described in circulars of information and other advertising pamphlets has become a little harder to find each year. The installation of traps and racks in park waters will, if developed, provide sufficient spawn for all our needs. The construction of

rearing ponds in connection with the hatchery at Glacier Park station and with the hatchery to be constructed by the Bureau of Fisheries at Fish Creek on Lake McDonald will make it possible for Glacier National Park in cooperation with the Bureau of Fisheries to produce from park waters all fish necessary for restocking its lakes and streams.

It is strongly urged that very careful consideration be given the recommendations contained in our annual estimate for the 1931 fiscal year, for an appropriation to provide for the installation of spawn-taking facilities in Logging Lake, the construction of rearing ponds at Fish Creek, and the necessary labor and material for the harvesting of spawn and the operation of the rearing ponds.

The completion of the Roosevelt Highway around the southern boundary of the park, which seems assured by next July, makes it imperative that major camp ground construction be undertaken as early next spring as weather conditions permit, as the number of auto campers will be greatly increased.

The trail construction and reconstruction program should be continued until all trails needed are built and existing trails are brought up to high standards.

It is hoped the Transmountain Road will be completed at the earliest date consistent with the policies of the Department of the Interior.

GRAND CANYON NATIONAL PARK

M. R. TILLOTSON, Superintendent, Grand Canyon, Ariz.

The 1929 season again broke all records for travel to the park, with a total of 184,093 visitors, representing an increase of 10.1 per cent over the number registered for the preceding year. A feature of the travel statistics is a continued increase in the percentage of visitors arriving by automobile. This is accounted for in part by improvements to the Williams approach road on the south rim and in part by the fact that the automobile is naturally becoming the popular method of touring the country. A total of 37,858 cars carrying 115,073 passengers entered the park during the season, as against 32,316 cars carrying 99,303 passengers last year. This represents an increase of 15.88 per cent in visitors by automobile. Travel by rail shows an increase of 0.78 per cent. Although material increase in travel is noted on both rims, that for the north rim is far greater in terms of percentage. The increase in travel to the north rim amounted to 13.5 per cent, while the increase on the south rim was 9.65 per cent. The month of June, 1929, with a total of 37,733, broke all previous records for travel to the park in any one month. Automobile visitors were represented from every State and Territory in the Union, the District of Columbia, and 17 foreign countries. The following is a detailed statement of travel:

	By automobile		By rail	Miscellaneous	Total
	Cars	Passengers			
South rim.....	32,420	97,735	64,098	882	162,715
North rim.....	5,438	17,338	3,993	47	21,378
Total.....	37,858	115,073	68,091	929	184,093

WEATHER

During a portion of the winter unusually cold and unsettled weather conditions interfered to some extent with automobile travel to the park and resulted in the temporary closing of certain sections of roads on the south rim. During the summer the drought which has prevailed in this section of the country for the past several years was broken by repeated showers and an unusually heavy total precipitation. Although this had its effect on automobile travel during and immediately following such heavy rainstorms, the rains were a blessing to the country in general, making for greatly improved range and forage conditions. The altitude of the canyon rims averages around 7,000 feet on the south side and some 1,300 feet higher on the north. This, coupled with the noticeable lack of humidity, makes for an almost ideal summer climate.

Heavy snowfall on the north rim necessitates closing that section of the park between about October 1 and June 1. The south rim, however, is open the year around. There weather conditions are not ordinarily severe even in mid-winter. All canyon trails and the more important south rim drives are open every day in the year, except on rare occasions immediately following severe storms.

Climatic conditions are exceptionally delightful during the early spring and late fall. Every effort is being made to impress this fact upon the traveling public with a view to encouraging visitors to the park at such times rather than during the peak of the summer vacation season. Temperatures range during the season was from a maximum of 95° to a minimum of -7° and the total annual rainfall amounted to 13.99 inches.

Receipts and expenditures, fiscal year ending June 30, 1929

Receipts:

Donations.....	\$200. 00
Auto entrance fees.....	29, 396. 00
Franchise fees for hotels, transportation, camps, and general store.....	19, 327. 54
Permit fees (grazing, etc.).....	351. 16
Miscellaneous revenues (proceeds from sale of Gov- ernment stores, services, etc.).....	3. 63

Total, general fund revenues collected..... \$49, 278. 33

Expenditures:

Annual appropriation--

For administration, protection, maintenance and operation.....	\$103, 643. 50
For equipment.....	9, 096. 43
For physical improvements.....	34, 909. 02
	147, 648. 95
Emergency reconstruction and fighting forest fires.....	348. 53
Roads and trails.....	477, 286. 71
Donations.....	12. 50

Total expenditures, all appropriations..... 625, 296. 69

ROADS

Although no new funds for road construction work were allotted during the year, work was continued on contracts previously in force under the general supervision of the Bureau of Public Roads. This included completion of grading and drainage structures on the Desert View Road, paving with penetration macadam to station 509, subgrade reinforcement from station 509 on that road to the end of the Grandview Spur, subgrade reinforcement of Yavapai and Yaki Point Spurs, completion of penetration macadam paving on the south approach road from headquarters to the park boundary, subgrade and drainage structures on the south approach road to approximately station 1575, subgrade reinforcement on a few of the worst sections of that road, completion of grading and paving by penetration macadam of the double roadway in the village between the Williams approach road and the Harvey garage, and continuation of contract work on the north rim in connection with the Point Imperial and Cape Royal Roads.

On September 3 there were opened bids for grading of an additional 7.67 miles of the south approach road from Williams, which will carry the new grade to a point just beyond Howard Lake, and also for additional subgrade reinforcement on that road including the new 7.67-mile stretch. On September 7 there were opened bids for crushing and hauling of material for additional subgrade reinforcement on the Desert View Road between Grandview and Desert View.

The new Lee's Ferry Bridge was opened to traffic on January 9 and was officially dedicated on June 14. This bridge forms an important link in the highway system of northern Arizona, particularly between the south and north rims and between Grand Canyon, Zion, and Bryce Canyon National Parks.

Throughout the season work has proceeded on the construction of the new road leading to the north park boundary through the Kaibab National Forest. This work is being done by the Bureau of Public Roads from forest highway funds.

Considerable progress has been made on road-side clean-up within the park, especially on the Desert View Road.

TRAILS

The bridle paths previously constructed on the north rim to McKinnon and Natchi Points have been very popular and a similar trail is under construction to Point Imperial. The footpath from the north rim camp ground to Grand Canyon Lodge has been extended to the extreme end of Bright Angel Point and three of the prominent look-out points on the trail have been equipped with pipe guard rails. A careful survey has been made of the new Kaibab trans-canyon trail. Mileposts and directional signs have been erected at each half-mile point on the 20.6 miles of that trail.

Since June 1, 1928, the Bright Angel Trail, formerly owned by Coconino County, has been owned and maintained by the Government. Although this trail is sadly in need of rebuilding to bring the grades and alignment up to the national park standards, it has been maintained during the past year under Government ownership in far better condition than ever before in its history.

BUILDINGS

On Saturday, April 6, there was formally opened the new park administration building, which provides adequate office facilities for the local administrative forces. Other buildings constructed during the season were two fire towers, one on the north rim at Bright Angel Point and the other on the south rim at Signal Hill, a comfort station on the north rim camp ground, a caretaker's cabin in the south rim camp ground, chemical toilets at Yavapai Point, and a number of miscellaneous toilets. One residence building on the south rim, necessarily demolished to make way for the new village road, has been rebuilt. The barn at the old south entrance ranger station, as well as the old log ranger station on the north rim, has been demolished. Other construction work done during the year includes a sewerage system on the north rim to connect the camp ground with the Union Pacific treating plant, a permanent water line to the north rim camp ground and continued development of camp grounds in the way of roads, tables, fireplaces, etc., at both the south and north rim headquarters, Ribbon Falls, Desert View, and Roaring Springs.

Although an appropriation of \$20,000 was available for the construction of a hospital and bids were received on plans and specifications prepared by the landscape engineering division, it was impossible to construct the building, and the money was necessarily allowed to revert to the Treasury because of the fact that the low bid was several thousand dollars in excess of the amount available. In the forthcoming appropriation bill it is planned to request a re-appropriation of this amount together with an additional \$5,000.

TELEPHONES

No new telephone lines have been constructed during the season, but a contract has been entered into with the Mountain States Telephone & Telegraph Co. whereby that company is now installing at the south-rim headquarters a modern telephone central system. To this central will be connected all of the park lines, as well as local commercial lines to be installed throughout the village area. This will provide 24-hour service through the park in contrast to the intermittent service formerly had when the only manner of connection and switching between lines was by a system of antiquated switches in the information office at such times as an information ranger happened to be on duty.

CAMP GROUNDS

Three main public camp grounds are maintained, two on the south rim at headquarters and Desert View, and one at Bright Angel Point on the north rim. At all of these wood and water are furnished to tourists without charge. Tables and fireplaces, garbage disposal, and sanitary facilities are provided. The headquarters camp grounds on both the north and south rims have connection with the sanitary-sewer system. Pit toilets are necessarily provided at Desert View. Supplementary and smaller camp grounds are provided at Ribbon Falls, Roaring Springs, and Indian Gardens within the canyon as well as temporary stopping places with appropriate toilet facilities at such points

as the foot of Bright Angel Trail, Cedar Ridge, McKinnon Point, Purple River, etc. It is planned to continue the extension of secondary camp grounds by additional construction at such points as Neal Springs, Point Imperial, Point Sublime, Havasupai Point, etc. The public camp grounds were used during the season by a total of 52,132 persons.

SANITATION

In spite of the fact that we have had considerable difficulty in securing a competent operator, the activated sludge plant on the south rim continues to function with a high degree of efficiency, and has, because of its efficiency and unique construction features, attracted the attention of sanitary engineers throughout the country. A sewage-disposal system on the north rim, as constructed by the Union Pacific System, was demonstrated during the past season to be highly effective. To this there is now connected the Park Service main from the north-rim camp ground, cafeteria, etc. Chemical toilets at Indian Gardens and at Yavapai Point have proven very satisfactory. The modern garbage incinerator on the south rim continues to function most efficiently. Although garbage-disposal methods on the north rim are very crude and primitive, this has been handled with a minimum of nuisance. Plans have been prepared and approved for the construction of a modern incinerator on the north rim, and funds for such construction are now available. The cost of this project is to be borne entirely by the Union Pacific.

Continuous analyses, both chemical and bacteriological, are made of the treated effluent at the south-rim disposal plant, and tests are also made on the raw sewage and samples taken from tanks during various stages of treatment. The operator in charge of the treating plant also conducts frequent tests on various drinking-water supplies.

The superintendent of this park has always considered sanitation measures of all kinds as of the utmost importance. Careful watch and check of this feature is continually maintained; and while there is still much to be done in the way of added sanitary facilities, it is felt that the emphasis that has continually been placed on the necessity for the most modern facilities has been extremely worth while.

EDUCATION AND MUSEUM SERVICE

The Yavapai Point observation station has been continuously in operation and has proven a most valuable facility in connection with the educational program. There is a marked increase in the number of visitors to the museum and in the interest taken in the opportunity thus afforded for study of the natural features connected with the park. Informal talks and lectures are given there throughout the day by the park naturalist and his assistants. The so-called nature guide walks are conducted on both the north and south rims. Each evening during the summer season a nature talk is given in the south-rim camp grounds around a large open-air fireplace. On the north rim these talks are given in the recreation room in Grand Canyon Lodge by the temporary ranger-naturalist, who has charge of all entertainment features at the lodge. The Grand Canyon Nature Notes are issued regularly each month.

In this general connection I wish to comment most favorably upon the splendid support and assistance that has been given to the general educational program in the park by such men as Dr. John C. Merriam, Dr. David White, Dr. Harold Bryant, Dr. Douglas Johnson, Dr. J. P. Buwalda, Dr. Vernon Bailey, and many others.

The local force chiefly responsible for educational facilities consists of one park naturalist and two temporary ranger-naturalists employed during the summer season only. It is very apparent that this force should be increased by the addition of at least one permanent assistant naturalist.

BOUNDARY SURVEYS

The most important part of the boundary between the park and the Kaibab National Forest on the north rim has been surveyed and posted, a stretch of 14.5 miles. The entire south boundary of the park from the Little Colorado River to the vicinity of Mount Burro is now surveyed and posted, a length of 72.7 miles. Standard boundary signs are placed at an average distance of 150 feet apart.

GRAZING

Certain grazing permits within the park were modified during the season to conform to seasons and ranges prescribed for the same permittees by the Forest Service. It is very strongly felt, however, that all grazing within the park should be eliminated at the very earliest practicable date.

SURVEYS

A topographic map of the north-rim camp ground was made by the park engineer and of the Desert View camp ground by an engineer from the office of the chief engineer.

SIGNS

In addition to the posting of boundaries as above mentioned, there were purchased and erected during the season a total of 438 road, trail, directional, guide, and warning signs. A large boundary sign was also erected alongside the railroad tracks so that rail visitors might know when they are entering or leaving the park.

ROAD, TRAIL, AND TELEPHONE MILEAGE

In Grand Canyon National Park there are approximately 147 miles of roads, 167 miles of trails, and 96 miles of telephone lines.

OPERATIONS OF PUBLIC UTILITIES

Splendid cooperation is had both with Fred Harvey and with the Utah Parks Co., and the service rendered by these companies to the traveling public is of an unusually high class. Additional facilities completed or under construction during the year by the various public operators are as follows:

UTAH PARKS CO.

- Garage.
- Auxiliary Diesel power plant.
- Additional 100-horsepower unit in hydroelectric plant.
- Additional triplex pump in pumping plant.
- Dormitory for male help.
- Cafeteria and delicatessen in public camp ground.
- Two linen cabins.
- Photographic studio.
- Five additional 4-room de luxe cabins.

This makes on the north rim a total of 100 two-room standard cabins and 60 de luxe rooms. During the past winter Union Pacific engineers made a study of the possibility for water development from Clear Creek in connection with possible future hotel development on Cape Royal.

Grand Canyon Lodge closed last fall on October 6 and opened this spring on May 28. It has had another very successful season and its increasing popularity is very evident.

FRED HARVEY AND SANTA FE

- Gasoline storage facilities.
- A number of 2-bed cabins at Phantom Ranch.
- Twenty-five additional temporary tent cottages at Bright Angel.
- Twenty housekeeping cabins (making a total of 57 in the south rim camp ground).
- Fence and gate at the railroad station grounds.
- Six new residence buildings on Avenue A.

Plans have been approved and material has been purchased and delivered for the construction of a sewerage system at Phantom Ranch. Construction work on this project will be done this winter.

The increase of visitors has taxed south rim hotel facilities almost to the limit and on one or two occasions guests were necessarily turned away. The need for an entirely new Bright Angel hotel development is very urgent.

TRANSPORTATION

Road conditions on the north rim have unfortunately been such that it was impossible to give the visitor the side trips as advertised. With the completion of the Cape Royal and Point Imperial roads this condition will be altered.

The Utah Parks Co.'s franchise was amended by including in it transportation service, both by bus and saddle horse. Fred Harvey has purchased and put into use on the south rim 6 modern Cadillac 7-passenger cars and 13 Yellow car 16-passenger busses.

FOREST FIRES

Although the fire danger in this park is not serious compared with some of the other parks, constant vigilance is necessary to protect the forested areas from fires, particularly on the north rim where lightning storms are prevalent. Two new fire lookout towers have been erected during the season, one on the north rim and one on the south rim. These, in conjunction with the fire tower at Hopi Point and with lookouts in the adjoining national forests, give the basis for a first-class protection system. Formal cooperative fire protection and suppression plans have been drawn up and put into force between the park and the Tusayan National Forest on the south and the Kaibab National Forest on the north.

The park superintendent is chairman of the local forest protection board for the district comprising Arizona and New Mexico; semiannual meetings of this board are held and are felt to be of extreme value and importance. The spring meeting was held this year in Santa Fe, N. Mex., and it is planned to hold the next meeting in Phoenix about the middle of November.

The total number of forest fires in the park for the year was 10. Of these 7 were caused by lightning and the remainder were caused by human agencies. The total acreage burned over was 246. The largest individual fire occurred on June 27 in Cremation Canyon on the south rim. This burned an area of 93 acres.

POST OFFICE

There is urgent need in the park of new and more adequate housing facilities for the local post office. This need was recognized by the Post Office Department, plans for an appropriate building were drawn, and an effort was made to secure its construction on rental basis. This was unsuccessful due to lack of bidders. However, the matter has not been dropped, and it is hoped that a new post office may be provided at an early date.

LOCAL BOARD CIVIL SERVICE COMMISSION

Assistant Superintendent P. P. Patraw, in his capacity as secretary of the local civil service board, conducted six examinations for various positions during the year. As a result of these examinations 12 successful candidates were secured and 6 appointments made.

PUBLIC UTILITIES TO COOPERATE IN OPERATING HOSPITAL

Through cooperation with Fred Harvey and the Santa Fe Railroad Co. a plan for the operation of a hospital at Grand Canyon was agreed upon.

With the opening of the Lees Ferry Bridge a number of applications were filed with the State corporation commission for permit to operate busses over that route and between the north and south rims. These were finally settled by giving to Fred Harvey a permit to operate from El Tovar to the bridge and the Utah Parks Co. to operate from the bridge to Grand Canyon Lodge. As soon as possible these companies will inaugurate a rim-to-rim bus service over this route.

WILD LIFE

The Kaibab deer herd on the north rim is in fair condition and continues as a great attraction to tourists visiting that portion of the park. Detailed examinations of the winter range on the north rim were made during the season by the superintendent, the chief ranger, and Dr. Vernon Bailey of the Biological Survey. It was found that forage crops used by the deer were being heavily overgrazed, especially on the west winter range. In places this overgrazing was so heavy as to have practically killed out some of the more important items of deer feed, particularly the cliff rose. High up on the summer range it was found that the terminal buds of the young pine, fir, and spruces had been severely nipped throughout by the deer and that quaking aspen reproduction was almost entirely absent. Very reluctantly, the local park officers agreed that some reduction in the Kaibab herd would be necessary in order to bring it to a number where it could be continually supported in good condi-

tion by the amount of winter range available. It is felt, however, that this reduction should, if at all possible, be by means of trapping and shipping deer to ranges elsewhere in the country less fully stocked, rather than by hunting. Just at present funds for such activities are not available and the hunting camps established by the Forest Service will be in operation again this season.

The Arizona Fish and Game Commission has taken a deep interest in the Kaibab deer situation and has made a modification of the game laws for this particular locality and to fit this particular condition. Under the rules established by the commission for the Kaibab this fall, the limit has been increased from one to two deer, and it is specifically provided that only one of the two deer killed by any hunter may be a buck. Furthermore, the hunting season has been extended for the Kaibab to last from October 1 until December 15.

It is realized that one contributing factor toward the depletion of the winter range has been the long extended drought. Since this was broken by heavy rains during the past summer season, the natural feed has benefited very materially thereby and it is hoped that with the reduction to be accomplished this fall by controlled hunting, the range and deer herd will be in such condition that further killing will not be necessary and that the increase in the herd, if beyond that which the range will support, can be taken care of thereafter by trapping and shipping.

For the past two seasons fawns from the Kaibab herd have been trapped and transported by truck to the south rim, where they have done very well and have proven an object of the greatest interest to the tourists. It is planned to continue this transportation of fawns again this fall and the general manager of the Scenic Airways Co. has offered to transport by airplane such fawns as we may secure on the north rim. No charge will be made for this service.

The antelope which were imported from Nevada several years ago and placed on the Tonto Plateau are in fair condition only and are just about holding their own. Mountain sheep are occasionally seen in the canyon, but there is no definite information as to whether the herd is increasing.

During the season park officers killed 31 coyotes, 3 bobcats, and 3 foxes. In addition to these, 129 burros were killed during the season, making a total of 1,226 burros killed since the campaign of extermination of these animals was started in 1924. With the killing of this number of burros the flora of the Tonto Plateau and the entire area within the canyon proper has benefited very markedly.

As a result of stocking done several years ago in Bright Angel Creek, fishing has been excellent in that stream all this season. Trout are now found all the way down the stream to its mouth. Since trout have done so very well and are increasing in number and in size, the limit in Bright Angel Creek has been raised from 5 to 10 fish per day. When the limit was raised by the superintendent the State fish and game commission was requested to issue an order making the limit within the Grand Canyon National Park to conform. This they readily did so that now the State law conforms to the Federal regulation.

An investigation of Shinumo Creek indicated that planting done in these waters several years ago was unsuccessful. Another stream, Clear Creek, was stocked with trout during the season.

The following is an estimate of the number of game animals within the park:

	North rim	South rim	Total
Deer	2,500	350	2,850
Mountain sheep	250	250	500
Antelope		11	11

AIRPLANE TRANSPORTATION

Two years ago the Scenic Airways Co. instituted sight-seeing trips by airplane over the canyon. Their operations were conducted from an airport located in the Tusayan National Forest, some 18 miles south of the park headquarters and entirely outside the park. Repeated efforts were made by this company to secure recognition by the Park Service and authority for operating within the park. Finally an arrangement was made between the National Park Service and Fred Harvey whereby the Scenic Airways were allowed to maintain an office within the park in connection with the Fred Harvey transportation department. Business is now solicited at the hotels and tickets for the

sight-seeing trips are sold within the park, the base of operations still being outside. Signs are prominently displayed over the transportation desk and a notice is printed on all tickets sold and on other literature distributed to the effect that the operations of this company are entirely outside the park, that neither the National Park Service, Fred Harvey, nor the Santa Fe Railway Co. is in any way responsible for the operations of the company. In other words, the activities of the Scenic Airways within the park are conducted on what might be termed an experimental basis in order to determine the extent to which such service is of value to the park visitor.

Sightseeing trips of this nature are being made daily and are extremely well patronized. They are very popular with the park visitors, and it seems that such transportation service, in this park at least, has come to stay. It is felt that the service should soon recognize the airplane as a means of transportation to and trips over the park and make arrangements whereby such business can be controlled and regulated by the department, as is that of a transportation company using saddle mules or busses. At present the management of the Scenic Airways is in very competent hands. The company has cooperated in every way possible and has shown every willingness to work in a fair-minded way toward the final solution of the entire problem.

With the installation of Wasp motors in the Ford tri-motored planes used by this company sufficient lifting power is had to enable these planes to take off at the high elevation of V. T. Park on the north rim. Consequently, late this season a regular trans-canyon service by airplane was instituted, thus enabling many visitors to each rim to make the trip across the canyon and visit the opposite rim. Arrangements have been or are being made for transportation by bus between the airport on each rim and the hotels, such bus service to be handled by the regular transportation operation.

MISCELLANEOUS

During the season a check has been made of the various areas throughout the park occupied by public operators. Revised plats and maps of such areas have been prepared to bring them up to date and have been filed with the department.

A number of mining claims within the canyon have been discovered to be still of record and action has been taken toward having them examined, and, if possible, invalidated by the General Land Office.

In December, 1928, a trip down the Colorado River by boat was attempted by one Glen R. Hyde and wife, of Hansen, Idaho. The boat reached the park without incident and the two occupants continued downstream after replenishing their supplies here. After the party was several days overdue at Needles, searching parties were organized to look for the missing couple. Assistant Superintendent Patraw accompanied one such party and Chief Ranger Brooks another. Airplanes were also used in making the search. The Hyde boat was finally located near Diamond Creek, but no trace of either Mr. Hyde or his wife was ever found.

Throughout the winter seasons it has been the plan systematically to explore the unknown side canyons within the Grand Canyon proper. Several successful trips of this nature were made during the past winter. One exploration party consisted of Chief Ranger Brooks, Park Naturalist Glen E. Sturdevant, and Park Ranger Fred E. Johnson. In crossing the river at the conclusion of their trip, the boat which these park officers were using was swamped. Sturdevant and Johnson were drowned on February 20. The body of Mr. Sturdevant was recovered, but several searching parties failed to find the body of Ranger Johnson. A double funeral ceremony for the two men was held at park headquarters on February 26, the tenth anniversary of the creation of Grand Canyon National Park.

GRAND TETON NATIONAL PARK

SAMUEL T. WOODBRING, Superintendent, Moose, Wyo.

The Grand Teton National Park, Wyo., was established February 26, 1929. The superintendent did not take active charge until the latter part of June, because snow conditions made it impracticable to travel into the region by automobile.

DEDICATION

The park was formally dedicated to public use on July 29. The dedication was held on the shore of String Lake, with the Teton Mountains forming the background for the simple yet impressive ceremonies. The National Editorial Association, which held its annual convention in Cheyenne and was later to visit Yellowstone, was invited by the director to assist in the dedication of the new park. Governor Emerson, of Wyoming, on behalf of the State, expressed concurrence in the act of Congress creating the park and presented it for the use of the public. Director Albright accepted the park in the name of the Department of the Interior, and Erwin Funk, past president of the National Editorial Association, delivered the dedicatory address. It is estimated that approximately 700 people were present, including, in addition to Park Service officials and nearly 300 members of the Editorial Association, railroad officials, ranchers in the vicinity, and guests of neighboring dude ranches, the latter in western costume giving considerable local color to the scene.

TABLET PLACED ON TOP OF GRAND TETON

At the close of the dedication ceremonies, tribute was paid to William O. Owen, who made the first proved ascent of the Grand Teton, and a bronze tablet, presented by Mrs. Owen and commemorating Mr. Owen's first ascent on August 11, 1898, was unveiled and presented to the superintendent. Permission was given Dr. F. M. Fryxell, of Augustana College, Ill., and Phil D. Smith, both park rangers, and William Gilman, to place this tablet on the summit of the Grand Teton. The young men started for their base camp near timberline that day and the following day put the tablet in place at the top of the peak.

FIRST ASCENT OF THE EAST SLOPE OF THE GRAND TETON

On July 22 R. L. M. Underhill, of Cambridge, Mass., a member of the Alpine Club of London, and R. A. Henderson, of West Newton, Mass., of the American Alpine Club, climbed the east ridge of the Grand Teton. The mountain has been climbed many times, particularly in the past few years, on the west side, but never before had it been climbed on the east slope. They found the route exceedingly difficult and were forced to descend by the regular route. Other difficult peaks of the Teton Range were climbed by the two men during the period of their visit in the park.

TRAVEL

Because of the great influx of automobile tourists into the valley, hotels at Jackson and other points were taxed to capacity and there were times when tourists had to go to Victor, Idaho, and points in the Hoback Canyon for lodging.

Due to the fact that there are no formal entrances to the park and therefore no automobile check, except at the public automobile camps, travel statistics for the Grand Teton National Park are taken from those shown by the Snake River, or southern entrance to Yellowstone National Park. It is estimated that 51,500 people visited the park during the year. Of these 8,334 people in 2,474 automobiles used the public automobile camp grounds.

PERSONNEL

The personnel at the Grand Teton National Park consists of the superintended, 1 temporary clerk, 1 permanent park ranger, and 2 temporary rangers. Next year, as larger appropriations become available, it will be necessary to have more rangers for fire and game patrol work and camp and information duty.

PARK ANIMALS

Moose.—Moose are abundant in the Grand Teton National Park. Tourists continually report seeing them along the horseback trails and in the many meadows and swamp lands.

Bears.—Black bears are abundant in the higher country and grizzly bears are occasionally seen in the deep canyons where the tourists seldom travel. With two or three years of protection they will be as plentiful here as in the Yellowstone National Park.

Elk and deer.—At this season of the year elk are plentiful in the higher altitudes, but not until the first snows come do they come down to the floor of the valley. Then large herds journey toward the town of Jackson, where they are fed at the Biological Survey ranch during the months of heavy snowfall. Deer are occasionally seen by visitors, and particularly in the Leigh and String Lake section.

Mountain sheep.—Despite doubts generally expressed in this section as to the presence of mountain sheep in the park, I have positive proof that a good-sized band ranges at the head of Leigh Canyon. During the latter part of August a big-horn ram was seen crossing the floor of the valley from Timbered Island to the base of the Teton Mountains. It was the first big-horn sheep seen on the floor of the valley in recent years.

Antelope and white-tailed deer.—A Forest Service ranger, from the east side of the valley, reported seeing in July 6 antelope and 6 or 7 white-tailed deer about 7 miles south of Yellowstone National Park. Neither species is common at that point and this is particularly true of the antelope.

FISH

Fishing this year has been only fair in Jenny, String, Leigh, Taggart, and Bradley Lakes, and with this in mind, 50,000 eggs were planted on August 15, and in early September 250,000 fry were planted in String, Leigh, and Jenny Lakes.

SIGNS

Some two or three hundred signs were removed from trees, poles, and buildings in the automobile camp grounds at Jenny and String Lakes. New signs were painted and put on poles erected for the purpose, and as a result the sign system presents a very neat appearance.

SERVICE TO THE PUBLIC

Mrs. R. C. Kent operates a small camp of tent accommodations, bakery, and eating place, under a 1-year lease from the Forest Service. The lease expires December 31, 1929. The Jenny Lake Inn, as it is called, has furnished accommodations to nearly 2,000 people during the summer.

Harrison R. Crandall, park photographer, has served many visitors this summer in his studio. His place of business has served very much as an information office due to its close proximity to the main highway and its location on the branch road which leads into the park camp grounds at String and Jenny Lakes. Mr. Crandall is conducting an exceptionally high-class business and many favorable reports have come to the headquarters office concerning it.

Charles Wort, who also operates under a Forest Service lease expiring December 31, conducts a boating service at Jenny Lake and has served over 2,500 people in motor and row boats during the season.

Aubrey Lyon, whose Forest Service permit expires at the end of the present year, has served close to 500 people on the trails of the park with horseback and pack-horse outfits, and has taken many parties to the Grand Teton Glacier, which is one of the outstanding scenic points of the park.

ACTIVITIES OF ADJACENT DUDE RANCHES

During the months of July and August the great majority of the 500 guests of the neighboring dude ranches used the trails of the park for horseback and pack-outfit trips. By September many of the guests had left for their eastern homes and use of the trails declined accordingly.

HAWAII NATIONAL PARK

THOMAS J. ALLEN, Jr., Superintendent Hawaii National Park, Territory of Hawaii

GENERAL

Hawaii National Park was under the supervision of two different superintendents during the fiscal year 1929. Richard T. Evans was on duty during the first part of the year and resigned to return to the Geological Survey in November. Thomas J. Allen, jr., formerly of Rocky Mountain National Park,

was appointed superintendent of Hawaii National Park, effective November 21, 1928, and arrived at the park November 30. Also practically the entire personnel of the park changed during the past year.

The post-office name of the park was changed, upon the recommendation of the superintendent, from Volcano House, Hawaii, to Hawaii National Park, Hawaii. This change was effective April 1, 1929.

WEATHER

As is usual in the Hawaiian Islands, the climate throughout the entire year was very pleasing and without extremes. The past winter, however, had two months of slightly colder weather than is customary in these latitudes. The pleasant climate during the summer season is proving to be quite a factor in inducing summer visitors to visit Hawaii.

VOLCANIC ACTION

The early part of the year showed no definite volcanic action or movement other than the usual slight earth tremors and minor avalanching. Early in January a large section of the south rim of the fire pit Halemaumau, in Kilauea Volcano, cracked up and forced the removal of the public lookout point to a different location. This earth cracking was undoubtedly due to lava movement beneath the pit and was followed in February by an eruptive period. Beginning with this, Hawaii National Park has again attracted the attention of the world by the occurrence of two volcanic lava flows at Kilauea Volcano within the space of only five months. At 1 a. m. February 20, 1929, a spectacular flow of lava commenced in fountains spanning one end of the entire floor of the volcano fire pit. For 36 hours fountains played continuously to heights of 100 to 200 feet with a constant roar of pressure and gushing. Lava again broke out on the southwest bottom of the same pit during the morning of July 20, 1929. Three distinct, steady fountains occurred with two other fountains operating spasmodically in the pit center. This eruption threw molten lava as high as 300 feet and built up three distinct cones against the talus slopes at one side of the fire pit. Day and night the constant roar and wonderful spectacle continued throughout a 4-day period. Thousands of persons visited the park during the action. Special steamers were run from the other islands. A continual stream of cars arrived from the various districts of this island and much publicity covered the entire world. The February flow of lava left 55 feet of new lava in the pit and the July flow brought still another 45 feet. The pit depth is now 1,050 feet, its width 3,000 feet, and its length 3,500 feet. The new lava floor covers an area of 54 acres.

Present indications, based on definite cycles of past volcanic action here, are that still a third eruption will occur during 1929 and that in 1930 lava may return to Kilauea for an indefinite period.

The number of earthquakes occurring have been of the expected number, approximately 1,000 during the year with two fairly heavy ones, neither of which caused any damage.

VOLCANO OBSERVATORY

The volcano observatory of the Geological Survey continued its studies and experiments under the able direction of Dr. T. A. Jaggar. The benefits of Doctor Jaggar's work are becoming increasingly plain, especially so during the present time when it is possible for him to announce expected eruptive periods based on the actual happenings of his past years of study. To date all of Doctor Jaggar's expectations of action have closely coincided with actual occurrence. Doctor Jaggar and his personnel have been very helpful to this service at all times.

VISITORS AND TRAVEL

Due to a healthy growth in tourist travel to the entire group of Hawaiian Islands and to the occurrence of two volcanic eruptions, attendance at this park has shown a large increase. Even without the crowds which attended during the eruption periods our figures would have shown a normal gain. Through its location and the fact that we have pleasant weather throughout the entire year, Hawaii is visited by a great many notable persons. Special groups visiting the park include a Japanese Navy tanker; a group of members

of the Sierra Club of California; a Japanese merchant marine cadet ship; various officers of the United States Navy; and four around-the-world tour vessels. The following tables will show the travel figures for the period October 1, 1928, to September 30, 1929:

COMPARATIVE TRAVEL, 1928-29

	1928		1929	
	Cars	Persons	Cars	Persons
General.....	12, 175	61, 596	15, 415	92, 483
Kilauea Military Camp.....	54	3, 644	68	3, 072
Hotel and summer camp.....	2, 276	13, 174	2, 864	14, 302
Grand total.....	14, 505	78, 414	18, 347	109, 857

REVENUES

	1927-28	1928-29
Cottage site rentals.....	\$450. 00	\$450. 00
Grazing permits.....	27. 00	25. 00
Hotel lease.....	1, 000. 00	1, 000. 00
Miscellaneous.....	32. 52	-----
Grand total.....	1, 509. 52	1, 475. 00

APPROPRIATIONS

	1928-29	1929-30
Roads and trails in national parks.....	\$253, 300. 44	\$6, 500. 00
Administration and protection and maintenance.....	21, 715. 00	26, 395. 00

PUBLIC CAMP GROUNDS

An increased interest has been shown in the use of public camp-ground facilities. The past year showed 9 cars with 22 persons using our camp ground as against 2 cars and 5 persons for a year ago. A return of lava to the fire pit is expected to increase the use of the camping privileges.

CONSTRUCTION AND MAINTENANCE

Maintenance and repair of 25 miles of road and 90 miles of trail were conducted throughout the park area. Road maintenance was increased due to heavy rains during two of the winter months and due to the enormous travel during volcanic eruptions. The funds allotted to this park for normal maintenance would not have been sufficient to perform all of the work required and were augmented by an additional \$1,500 allowed for construction maintenance on the new Chain-of-Craters and Around-the-Island Roads. Road maintenance included the elimination of several very dangerous curves. One of these was on the road leading to Uwekahuna Observatory and the others were on the Kilauea Crater Road.

Maintenance work was performed on the various park buildings, including the office, rangers' cottages, equipment shed, and laborers' quarters. Roofs of all park buildings were painted, the color being changed from red, which is usual in Hawaii, to a dark green, which coincides more nearly with the natural surroundings and forest growth.

Construction work has included erection of two new dwellings for employees and a lava masonry checking station at the main entrance to the park.

A 2-mile section of trail leading out of the crater of Haleakala was obliterated by slides caused by winter rains and has been replaced in a new location. In the Kilauea section a new trail of 2.6 miles has been constructed between the end of the Chain-of-Craters Road and Napau Crater at

the extreme southeastern corner of the park. This trail passes through two fields of especially good lava trees and leads past a very beautiful forest of tree-fern growth. There are practically no grades throughout the entire length. A new trail has also been constructed extending from the Devil's Throat along the old abandoned Kau Desert trail and down through Kipuka Keana Bihōpa to a temporary terminus on the cliff overlooking the park seacoast area. Three miles of this trail are entirely new work and open up to visitors a section hitherto isolated from them. Funds are available for still other small trail projects which will be completed during the 1930 fiscal year.

TERRITORIAL COOPERATION

The Territorial legislature which met during the past winter passed a loan fund bill by which bonds are permitted to be sold for the construction of certain new roads within the territory. This bill included an amount of \$300,000 to be used as the Territory's share of the total cost of construction of a Federal-aid road on the sides of Mount Haleakala on the island of Maui. The terminus of the Federal-aid project will be at the boundary of the Haleakala section of Hawaii National Park. Construction of this road will permit construction by the Park Service of an extension of this same road to the rim of Haleakala crater. Territorial engineers are now on the ground placing construction markers, and it is expected that bonds will be sold and the contract for construction let simultaneously on November 1, 1929.

Also during the past session of the legislature the county of Hawaii was given authority to issue road-construction bonds to the amount of \$30,000 to be used in building a connecting road between this park at the southeastern boundary at the end of the Chain-of-Craters Road and the village of Kalapana on the Puna coast.

NATURALIST SERVICE

Educational work has consisted of lectures and field trips on volcanology, volcanic history, geology, botany, bird life, and other natural history. This work has been handled during the summer by Otto Degener, formerly professor of botany at the University of Hawaii. Lectures are given each steamer afternoon at the Uwekahuna Observatory and during the evening in the lobby of the Volcano House. Dr. T. A. Jaggar, of the Volcano Observatory, gave lectures to some special groups at the Volcano House.

HOTEL AND CAMP OPERATIONS

Accommodations for the public continue to be furnished by the Kilauea Volcano House, supplemented by Kilauea summer camp during the summer season.

The Volcano House, which is open throughout the entire year, showed a considerable increase in business. The summer camp, with the approval of the director, shortened its season to June 20 to September 15, as experience had shown but little business to be obtainable earlier or later in the summer. Operators of the hotel have formally notified this office that should their operation of the summer camp during the present year prove as unprofitable as it has during the past three years they would request permission to discontinue further operation of it. Although the summer business appears to be better than heretofore, it is not yet known how the company came out financially.

Only minor improvements have been made to Kilauea Volcano House during the year.

KILAUEA MILITARY CAMP

The operation of Army and Navy recreation areas on leased park land at Kilauea military camp has been continued. Both sections of this were operated very successfully with a large increase in patronage, which is restricted entirely to Army and Navy personnel. Capt. K. W. Thom, the commandant of this camp, has shown the finest kind of cooperation with the Park Service. Our relations have been of the most pleasant nature and Captain Thom has made a special effort to maintain his camp and the conduct of personnel in accordance with park regulations. The various commanders of the Navy section have also shown cooperation, but their brief terms of four months each hardly give them time to effect anything definitely.

WILD LIFE

Wild goats and pigs, which thrive in certain parts of the park by the thousands, continue as a menace to plant growth and reforestation on lava-covered lands. With the help of the Territorial Forestry Association one concentrated drive against goats resulted in the elimination of 1,100 of the animals from areas both in the park and surrounding our boundaries. An additional 900 goats were killed by smaller foraging parties and rangers.

PHOTOGRAPHER'S OPERATION

Application for contract to conduct a business as park photographer has been received from K. Maehara of Hilo, Hawaii, and has been tentatively approved by the department pending location of a studio site by the landscape division. Mr. Maehara has had many years experience in photographic work and should prove a very capable operator in this business.

LANDING FIELD

During October, 1928, the Interior Department granted the War Department permission to rehabilitate and use as an emergency airplane landing field a location formerly used for the same purpose in Kilauea Crater. Permission is granted for emergency use by Army planes only and no building construction has been permitted.

An application for permission to use this field for commercial airplane purposes has also been received from the Inter-Island Airways (Inc.), which plans to operate transport planes between the various islands of this group. Such permission has been withheld pending formulation of a definite national park airplane policy.

GOLDEN EAGLE SEARCH

During June, 1929, a final search for the airplane *Golden Eagle*, which was lost during the Dole trans-Pacific flight in 1927, was led by Ezra Frost, a brother of one of the pilots of that plane. Mr. Frost was assisted in his search by 11 Army planes, which thoroughly covered the slopes of Mauna Loa and definitely decided that the *Golden Eagle* had not crashed on this island as had been supposed. It is interesting that Ezra Frost was at one time employed as a temporary ranger in Rocky Mountain National Park under the present superintendent of this park.

VIOLATIONS

Although a large number of minor cases of vandalism and violation of park regulations were handled by the superintendent, no arrests were made.

During May, 1929, while the superintendent was on a trip to the island of Maui and to Honolulu, on official business, his residence in the park was entered and nitric acid scattered on furniture, clothing, bedding, linens, and fixtures. Practically no object in the entire house was spared. A thorough investigation by special investigator A. E. Farland, of the United States Department of Justice, the Hilo detective force under the supervision of Chief of Detectives George Richardson, Assistant United States Attorney W. C. Moore, and the superintendent, secured sufficient evidence to procure indictments against Park Ranger George D. Douglas, who has been arrested and charged with this crime. The investigation also disclosed evidence against Douglas for the violation of Territorial laws in unlawfully entering two other residences and in addition disclosed his removal from confidential park files of certain official letters. At the time of this report Douglas is under a total of \$3,000 bond on a Federal indictment charging him with theft of official correspondence and on Territorial indictments, five in number, charging him with unlawful entry into two separate houses and with malicious damage to the property of the superintendent, the superintendent's wife, and the United States Government. Trial of these cases is pending until the fall session of courts.

Ranger Douglas was discharged May 16, under charges of inability to perform his assignment and neglect of duty in the acid case.

RECOMMENDATIONS

The enormous crowds visiting this park during recent periods of volcanic eruption, together with the definite scientific expectation that lava will, within a matter of months, be present in Kilauea Volcano for a considerable period, or practically permanently, clearly show that it will not be at all possible to handle this park with the present ranger force. The presence of a live volcano makes it imperative that a sufficient force of rangers be on hand at all times to protect visitors at the firepit and to handle traffic. Recommendation is made that the ranger force be increased at once to not less than eight men.

The increased popularity and growth of the park have created a need for replacing the present temporary administrative building with a permanent structure of proper capacity and location.

With the exception of the new roads constructed a year ago, the balance of the park roads are obsolete and worn out. Recommendation is made that all existing roads now in use be rebuilt during the next year and that an oil-process surface be given the entire park system.

HOT SPRINGS NATIONAL PARK

Dr. HUGH DE VALIN, Superintendent, Hot Springs, Ark.

GENERAL STATEMENT

The total receipts of the pay bathhouses for this year were \$570,486.14, as compared with \$530,253.75 for the fiscal year 1928.

The net profits reported for the 19 pay bathhouses aggregated \$202,946.40. Two pay bathhouses reported deficits this year, amounting to \$5,785.06. Total profits, including deficits for this fiscal year, amounted to \$197,161.34, as against \$160,844.48 for last year.

The baths given were as follows: Complimentary, 1,601; paid, 658,065; at the United States free bathhouse, 102,882; at the Leo N. Levi Memorial Hospital bathhouse, 11,080; making a grand total of 773,628 baths, as compared with the grand total of 784,609 baths given during the previous year.

THE SPRINGS

The springs, 46 in number, are located on the Central Avenue slope of Hot Springs Mountain. The estimate daily flow is 850,000 gallons of hot water with an average temperature of 142° F. The water is collected and distributed to the Army and Navy General Hospital, the United States free bathhouse, the Leo N. Levi Memorial Hospital bathhouse, and 19 pay bathhouses, all of which are under Government supervision.

ADMINISTRATION

The park is in charge of the superintendent, who has supervision over all matters pertaining to the park and its management and to the general sanitation and control of all bathhouses receiving hot water, as well as control over all employees connected with the bathhouses.

The park personnel is divided into the following departments: Administrative, police, maintenance, and free bathhouse and clinic.

Receipts and Expenditures

Receipts:	
Water rent.....	\$40,760.00
Ground rent.....	200.00
Privilege fees—	
Registered physicians' continuance fee.....	\$2,500.00
Physicians' examination fee.....	30.00
Physicians' registration fee.....	75.00
Bath attendants' certification fee.....	1,736.00
Masseurs' certification fee.....	599.00
Commissary concession fee.....	5.00
	<hr/>
	4,945.00
Miscellaneous—	
Sale of attendants' badges.....	9.75
Sale of unserviceable property.....	16.15
	<hr/>
	25.90
Total, deposited to credit of miscellaneous receipts.....	<hr/>
	45,930.90

No receipts were deposited to the credit of the special fund available for the improvement of the park for sale of lots as all lots have been sold.

The unexpended balance of the fund is \$12,656.30, the unallotted funds being \$4,058.82.

The following expenditures were made by the park from its appropriation:

For administration, protection, and maintenance-----	\$68,326.86
For construction of physical improvements-----	1,133.32
Total expenditures-----	69,460.18

CONSTRUCTION, MAINTENANCE, AND REPAIRS

Superintendent's residence.—The general maintenance work was conducted for the upkeep of the grounds about the house. New drains were installed about the grounds where necessary. Concrete steps were constructed in the rear of the house to replace old wooden steps. The heating system was overhauled and minor repairs made. The screens to the windows and doors were overhauled and repaired where needed.

Fountain Street residence.—The porches and several of the rooms were painted. Certain underpinning was repaired and new flooring was installed in several rooms.

Free bathhouse and clinic.—A break occurred in the pipe line at the bathhouse and a new section was installed. A new runway for wheel chairs was installed at the main entrance. Certain painting and plastering was done to the interior of the building. Repairs were made to the electric light wiring. The marble work in the bath hall was completed and repairs were made to a number of the shower baths. Certain sections of the sidewalk about the building were repaired. The heating system was given an overhauling and repairs made to various radiators. The fountain in front of the clinic was repaired.

Greenhouse.—A concrete floor was laid in place of the old wood floor.

Comfort stations.—Minor repairs were made to the various comfort stations in the park. A new comfort station was erected at the junction of Canyon and Ramble Street road on North Mountain.

Shelter houses.—Two new shelter houses were constructed, one on West Mountain and the other on Hot Springs Mountain.

Whittington Park.—The public tennis court was regraveled and the fountain was repaired. The Whittington Park residence was painted, as were also the pavilions and tennis court stands. A new water drain was installed on the grounds.

Grounds.—The infestation of caterpillars was very bad during a portion of the year and constant cutting and burning was necessary. All lawns were regressed and put in good shape. Trees needing topping received necessary attention. Two thousand tulip bulbs were planted at various points. New shrubbery grown in the park nursery was set out in various sections of the park. Planting of young trees in the interest of forestation was carried out during the year at various advantageous points. For the conservation of certain trees on Hot Springs Mountain a stone wall 50 feet long and 4 feet high was built in order to afford necessary root space and root protection. Dead and down timber was cleared in various areas of the park reservation.

Roads.—A new road along the north boundary of the free auto camp was completed by the county. The usual amount of maintenance and repair work, such as grading, cleaning of ditches, widening and repairing turns, graveling, etc., was conducted throughout the year. A wall was built and fill made in order to widen the road at one of the turns on the West Mountain Road. During the spring there was an excessive amount of rain, which caused a number of slides, and as a result there was rather an unusual amount of maintenance and repair work necessary for the upkeep of the roads.

Trails.—The usual maintenance work on trails, such as clearing weeds and gravel, repairing drains and the water breaks, was carried on. Metal signs were placed on new trails and old ones were renewed where needed. A number of new trails were built.

Electric lighting system.—Certain repairs were made to the electric system along Bathhouse Row and at other points throughout the park area. Electric-light poles of concrete were erected at certain points to replace the old iron standard poles. It has been found that these concrete poles can be made and installed at a smaller cost than is the case with the iron poles.

Water system.—The pipe line from two hot water springs near the Maurice Bathhouse was taken up and new pipe laid. The old water tanks back of Bathhouse Row were demolished. Fountains at various points in the park were repaired. Four drinking fountains were installed on Hot Springs Mountain for the convenience of visitors motoring or walking the trails.

Heating system.—All heating plants in park buildings were inspected, and overhauled, and repairs made where found necessary.

Machinery and equipment.—All machinery and equipment was given the necessary overhauling and repairs. The automotive equipment was built up a number of times, and all tractors, trucks, graders, etc., were kept in good operating condition. A new truck body was built and a 2-wheel water tank car was constructed for use in fire fighting. Two 1-ton Ford trucks, dump body, were added to the motor equipment. A stationary blacksmith forge was constructed for use in the shop.

Public camp grounds.—The drains about the grounds were repaired where necessary and all general débris was removed from the camp area. A wire fence between the camp grounds and the public road was installed. The ditches were cleaned, all weeds cut, and the roads graded. Stone pillars were erected at the entrance to the camp and a new sign placed between them. The boys' dressing room was moved nearer to the girls' dressing room, and a toilet house built between the two buildings to serve both places. Minor repairs were made to the various buildings in the camp.

Miscellaneous.—The park benches were repaired and painted. The old reservoir in back of the Fountain Street residence was partially demolished and reconstructed to serve as a paint shop and storehouse.

UNITED STATES FREE BATHHOUSE

The average number of persons bathed daily in the Government free bathhouse was 337, with a total of 102,882, as compared with an average of 323 and a total of 98,487 last year. The total number of persons bathing was 6,750, as compared with 6,566 last year.

The total number of patients examined and treated in the free clinic was 5,265 as compared with 5,467 last year. Of this number 3,986 were venereal disease cases. The nonvenereal cases were treated at the Leo N. Levi Memorial Hospital. The total number of examinations, treatments, analyses, etc., given in the clinic during the year was 137,834. Of this number 338 examinations were for the city board of health.

The course of instruction for physicians was continued at the clinic, seven physicians taking the same.

PAY BATHHOUSES

The following tables show the business of the pay bathhouses for the fiscal year 1929:

Bathhouse	Total baths sold	Baths re- deemed	Net paid baths sold	Paid baths given	Compli- mentary baths	Total baths given
Alhambra.....	23,935	4,617	25,288	25,227	7	25,334
Arlington.....	75,546	8,453	67,093	70,721	807	71,528
Buckstaff.....	55,961	7,472	48,489	48,455	95	48,550
Eastman.....	16,188	2,216	13,972	14,085	0	14,085
Fordyce.....	39,553	4,992	34,561	34,276	23	34,299
Hale.....	41,818	2,708	39,110	41,360	0	41,360
Imperial.....	44,106	4,050	40,016	40,525	84	40,608
Lamar.....	67,302	10,533	56,769	57,357	189	57,546
Maple.....	45,351	4,404	41,887	41,354	117	41,471
Monterey.....	55,201	7,347	47,856	47,537	53	47,590
Monterey (colored).....	29,458	2,306	18,153	17,341	63	17,407
Oak.....	49,062	6,077	42,985	42,472	3	42,475
Oak Sanatorium.....	18,707	2,368	16,339	16,536	0	15,566
Proctor (colored).....	17,609	475	7,446	11,520	0	11,520
Quapaw.....	55,040	7,080	50,969	50,829	139	50,968
Rosefellow.....	33,687	3,602	30,275	30,436	0	30,436
St. Louis.....	49,000	4,000	45,000	45,000	0	45,000
St. Louis (colored).....	13,600	2,200	11,400	11,500	0	11,500
Woodmen of Union (colored).....	8,858	8,858	8,858	8,431	0	8,431
Total.....	752,500	102,882	671,542	671,542	1,001	672,543

Bathhouse	Net amount received by attendants	Received for redeemed tickets	Total bath receipts less redeems	Receipts from massages, etc.	Total receipts	Total expenditures	Net profits
Alhambra.....	\$4,881.27	\$2,582.07	\$16,800.98		\$16,800.98	\$12,498.00	\$4,302.98
Arlington.....	13,139.96	7,601.76	70,216.44	\$13,777.13	83,993.57	37,171.99	46,821.58
Buckstaff.....	9,397.73	5,520.63	42,036.63	2,982.15	45,028.87	30,165.78	14,863.09
Eastman.....	2,718.46	1,674.66	12,426.89	1,939.00	14,365.89	9,219.76	5,146.13
Fordyce.....	6,813.32	4,172.12	33,713.18	4,235.73	37,948.91	29,046.92	8,901.99
Hale.....	5,330.51	1,748.98	29,461.22	396.00	29,857.22	20,784.41	9,072.81
Imperial.....	7,636.77	2,637.16	30,197.49	734.48	30,891.97	26,590.99	4,300.98
Lamar.....	11,011.23	7,245.18	46,475.62	4,568.29	51,043.91	33,871.89	17,172.02
Majestic.....	8,139.19	3,188.10	35,079.50	1,800.00	36,879.50	17,971.47	18,908.03
Maurice.....	9,156.76	5,401.51	41,417.29	3,893.09	45,310.38	30,150.08	15,160.30
Moody.....	3,515.55	1,526.11	14,003.44	1,327.70	15,331.14	11,336.90	3,994.24
Ozark.....	7,817.18	3,911.91	33,094.94	769.50	33,864.44	19,679.52	14,184.92
Ozark Sanatorium.....	3,148.43	1,425.57	11,561.53		11,561.53	7,288.90	4,272.63
Pythian (colored).....	2,176.43	239.27	4,599.93	1,900.15	6,500.08	7,712.28	1,212.20
Quapaw.....	9,866.26	4,900.15	41,808.65	1,824.29	43,632.94	31,096.44	12,536.50
Rockafellow.....	5,844.92	3,484.16	21,567.24	1,278.44	22,845.68	12,373.55	10,473.13
Superior.....	7,838.13	5,521.97	30,975.58	600.00	31,575.58	25,567.77	6,007.81
St. Joseph's Infirmary.....	2,184.64	1,504.99	8,697.91		8,697.91	7,655.71	1,042.20
Woodmen of Union (colored).....	1,522.80	141.36	4,355.64		4,355.64	8,928.50	4,572.86
Total.....	122,139.54	64,427.26	528,450.19	42,035.95	570,486.14	379,109.86	197,161.34

¹ Deficit.

Hot water and ground leases

Name of bathhouse	Lessee	Tubs	Date of lease	Expiration
Alhambra.....	Alhambra Bath House Co.....	18	Mar. 1, 1928	Feb. 28, 1938
Arlington ¹	Arlington Hotel Co.....	90	Jan. 1, 1925	Dec. 31, 1944
Buckstaff.....	Buckstaff Bath House Co.....	30	Jan. 1, 1912	Dec. 31, 1931
Eastman ¹	New York Hotel Co.....	89	May 13, 1912	May 12, 1932
Fordyce.....	S. W. Fordyce, jr., trustee	30	Jan. 1, 1915	Dec. 31, 1934
Hale.....	Union Trust Co., trustee	25	do	Do
Imperial.....	Charles N. Rix.....	24	Jan. 1, 1912	Dec. 31, 1931
Lamar.....	Lamar Bath House Co.....	26	Jan. 1, 1926	Dec. 31, 1945
Levi Memorial.....	Leo N. Levi Memorial Association.....	5	Nov. 1, 1924	Oct. 31, 1934
Majestic ¹	Majestic Hotel Co. (Inc.).....	23	Jan. 1, 1913	Dec. 31, 1932
Maurice.....	Maurice Bath House Co.....	30	Jan. 1, 1912	Dec. 31, 1931
Moody.....	New Moody Hotel Co.....	16	July 1, 1920	June 30, 1930
Ozark.....	Ozark Bath House Co.....	26	July 1, 1922	June 30, 1942
Ozark Sanatorium.....	Ozark Sanatorium Co.....	10	Sept. 17, 1922	Sept. 16, 1932
Pythian (colored).....	Pythian Bath House & Sanatorium Comm.	16	Dec. 16, 1924	Dec. 15, 1944
Quapaw.....	Quapaw Bath House Co.....	40	Feb. 1, 1922	Jan. 31, 1942
Rockafellow.....	Mahala J. Rockafellow.....	18	July 1, 1920	June 30, 1930
St. Joseph's Infirmary.....	Sister Superior.....	12	Feb. 1, 1924	Jan. 31, 1934
Superior.....	Superior Bath House Co.....	20	Feb. 15, 1916	Feb. 14, 1936
Woodmen of Union (colored).....	Supreme Lodge, Woodmen of the Union.	11	Mar. 1, 1922	Feb. 28, 1942
Arlington Hotel, grounds.....	Arlington Hotel Co.....		Mar. 21, 1914	Mar. 6, 1932
Hot Springs Mountain Observatory, grounds.....	Hot Springs Mountain Observatory Co.		Jan. 1, 1926	Dec. 31, 1935

¹ Water used in private rooms in portion of tubs leased.

SANITATION AND PUBLIC-HEALTH MATTERS

Regular inspections were made in all bathhouses. During the heavy winter bathing a special female inspector was placed on duty to make the inspections on the ladies' side. From two to three inspections were made weekly. During the rest of the year inspections were made weekly.

Bacteriological examinations of the water supplied bathhouses have been made regularly, but no contamination was found.

On the first of each month all bathhouse employees coming in personal contact with bathers were given a physical examination and conditions found were noted on their health cards. New employees were given complete physical examinations, including the Wassermann test, before being permitted to work in bathhouses.

Mosquito-control work has been conducted wherever breeding places might be found. Particular care has been taken to keep the public camp grounds free from mosquitos.

To increase the efficiency of bathhouse personnel and to provide more attendants, a school of instruction was held for one month. Lectures were given at intervals to bathhouse employees concerning their work.

Examinations have been held at irregular intervals for applicants for the position of masseur and masseuse in the bathhouses. Mental, oral, and practical, as well as complete physical examinations, were given.

The park authorities assisted the city of Hot Springs in the physical examinations, typhoid and smallpox vaccination, and Wassermann test of all persons engaged in handling foodstuffs in the city. Cooperation is also given in examination of various specimens submitted to the laboratory.

VISITORS

It is estimated that about 197,280 persons entered the park last year. Of these, 67,075 people came by train, 101,450 by auto, and 101,450 by stage, etc. The number of people using the Government free auto camp at the gorge was 191, coming in 1,365 cars.

CHANGE IN THE SUPERINTENDENCY

On July 16 Dr. Hugh de Valin, surgeon in the Public Health Service, relieved Dr. Joseph Bolten as superintendent of the Hot Springs National Park. Doctor Bolten had been at Hot Springs for nearly five years on detail from the Public Health Service.

LASSEN VOLCANIC NATIONAL PARK

L. W. COLLINS, Superintendent, Mineral, Calif.

The year 1929 in Lassen Volcanic National Park has been marked by greatly advanced progress bearing on the development, popularity, and administration of the park and notable events as follows:

1. All park activities have been greatly enhanced and more smoothly carried on as a result of suitable office, living, and warehouse quarters being made available this year. Further development of the administrative unit, started last season by the construction of additional residential and utility buildings, going ahead as fast as funds are made available. A machine shop has been constructed this year, and a bunk house and mess is under construction. An employee's cottage has been authorized and will be constructed during the fiscal year.
2. Boundaries were extended to include the area around Manzanita Lake, to the northwest, all of Brokeoff Mountain on the southwest, and an area including Red Cinder Cone on the east. All boundary lines were changed to eliminate many unnecessary jogs in the lines. This was accomplished by act of Congress on January 19, 1929. The park now includes 162.25 square miles, 103,940 acres.
3. The Loomis Memorial Museum, accompanied by a deed of 40 acres of land upon which the museum is located, was donated to the park and accepted for the service. This donation also included a caretaker's cabin, which is being used as ranger quarters until such time as funds are allotted and a new building can be constructed.
4. Road construction was greatly advanced. The major part of the Park Loop Highway, encircling Lassen Peak, was completed in regard to grading. Attention is to complete surfacing next season. A contractor is now at work on a 4.53 mile stretch from Kings Meadows to Lake Helen, and it is his intention to finish grading during the current working season.
5. There was a greater use of park trails by hikers than ever before and a considerable less use by horseback parties. As road development progresses, making the prominent points of interest within easy hike-by-trail, there will be considerable decline in the use of horses except in the northeast section of the park, which it is hoped will be kept untouched by road.
6. Visit of the Hon. Ray Lyman Wilbur, Secretary of the Department of the Interior, and party, including Director Horace M. Albright, of the National Park Service, to Lassen Volcanic National Park on July 4 and 5, 1929. The visit of Doctor Wilbur to Lassen is of noteworthy importance, as it is the first Secretary of the Interior to ever visit the park since its creation. Such a high official visit to the park is a great honor.

WEATHER

The early fall was mild with the first snowfall coming in October. Although there was sufficient snow to hamper most of the work progressing in this region October was in general regarded as a beautiful month. November saw the first of the heavy snowfall when on November 12, 13, and 14 a total of 24½ inches fell. This completely stopped all operations in the park. Snow fell during the remainder of the winter, but apparently did not pack because of the great number of clear days usually following the snow storms. On April 30 there was no snow on the ground at Mineral head quarters. An unusual spring and early summer was experienced. Snow fell in the southwest portion of the park on June 15 and 16 and covered the ground with approximately a 5-inch mantle. At Mineral but 2 inches fell. This proved to be the clearing storm for since that time neither rain nor snow has been present. The advantage of this late snow and rain was more than overcome by the fast disappearance of the snow and the effect it may have had for fire prevention was only temporary.

ADMINISTRATIVE

One permanent employee was added to the office force during the year in the capacity of clerk-bookkeeper-typist. Increased clerical and office work made it imperative that additional office help be authorized as fast as possible.

Appropriations.—Appropriations made available since the date of the last report are as follows:

Act	Purpose	Amount
Mar. 4, 1929.....	Administration, protection, and maintenance.....	\$18,850
Do.....	Construction other than roads and trails.....	5,551
Do.....	Road and trail construction.....	143,700
Total.....		168,101

Two hundred and ninety dollars allotted to field headquarters for designs and plans.

Four hundred dollars reserved for Washington office expenditures and \$250 as a budget reserve.

PROTECTION

The first permanent ranger position was authorized effective July 1 this year. A small force of three temporary men has been carrying on the protection work heretofore. This number of men is entirely inadequate to provide the maximum amount of protection that the entire park area warrants. Sufficient increases in ranger personnel should be provided another season.

Summer activities.—Fire and fish patrols, information, guide and compilation of travel statistics for record purposes, communication service, checking travel, camp grounds and police duty, and a great many other activities were carried on in furtherance of the protection of the park and the convenience of park visitors.

Fish planting.—As customary each season, the usual plant of trout was successfully carried out this year, largely by park rangers. Approximately 350,000 rainbow and eastern brook trout were secured from the Doming Springs hatchery and planted in the various lakes and streams of the park with amazingly small loss.

TRAVEL

While no perceptible increase in travel into the park has been evidenced this season, as previously expected, it is felt that in view of the abnormal condition in the northern Sacramento Valley affecting the agricultural and fruit industry and consequently local travel, the park has been accorded a wide range of popularity in the matter of nonlocal visitors.

Park visitors this year totaled 26,106 as compared with 26,057 last year. There were 8,370 private automobiles. While very little use is being made of the camp ground areas in the park, aside from those located at Butt Lake, Summit Lake, Warner Valley, Manzanita Lake, and the Sulphur Works because of the comparative inaccessibility as the result of the present incomplete units of the Park Loop Highway, it is estimated that 10,145, or 39 per cent, of the travel into the park used the present available camp grounds.

Total season travel by entrances 1929 and 1928

Entrances	By automobile		Miscellaneous	Total visitors	Entrances	By automobile		Miscellaneous	Total visitors
	Cars	Visitors				Cars	Visitors		
1929					1928				
Warner Valley....	3, 332	9, 176	-----	9, 176	Warner Valley....	3, 721	10, 867	22	10, 889
Juniper Lake....	694	1, 975	-----	1, 975	Juniper Lake....	505	1, 361	-----	1, 361
Sulphur works....	1, 098	3, 703	18	3, 721	Sulphur works....	892	3, 652	-----	3, 652
Manzanita Lake..	1, 247	4, 158	-----	4, 158	Manzanita Lake..	825	2, 928	-----	2, 928
Lost Creek.....	1, 339	4, 511	19	4, 530	Lost Creek.....	1, 477	4, 043	-----	4, 043
Butte Lake.....	660	2, 528	18	2, 546	Butte Lake.....	717	3, 184	-----	3, 184
Total.....	8, 370	26, 051	55	26, 106	Total.....	8, 137	26, 035	22	26, 057

CONSTRUCTION

Roads.—Construction of the original Loop Highway encircling Lassen Peak is fast nearing completion. The contracting this season of the final uncompleted unit of 4.53 miles assures the entire completion of this 21-mile-through park road next year.

Trails.—Construction of trails in the western portion of the park radiating from the Loop Highway to the various near-by points of interest will be practically completed this season. This development provides the west portion of the park with a series of trails aggregating 24 miles, which will enable the automobile tourist using the new road to visit the near-by points of interest by a short hike. In the eastern and southeastern sections of the park a number of important trails remain to be constructed and rebuilt, which it is hoped to successfully carry out next year.

Telephone lines.—A new telephone line was constructed from headquarters at Mineral to a point midway between Summit Lake and Warner Valley ranger stations. The old Brokeoff-Warner Valley trunk line was found unsatisfactory for permanent use because of original temporary construction, high maintenance costs, and interrupted communication facilities from time to time. The new line is of heavier materials and follows lower country, avoiding the heavier snows, and connects with the Summit Lake-Warner Valley line, giving headquarters connection over approximately 41 miles of line with three ranger and two lookout stations.

Buildings.—Authorization was granted in the present fiscal year appropriation for the construction of three additional buildings at our administrative site. Of the three, a machine shop has been completed, a bunk house and mess hall is under construction at present, and it is expected that the third, an employee's cottage, will be constructed before the year is ended.

MAINTENANCE

Roads.—That part of the Park Loop Highway which was turned over to the service last season required considerable heavy maintenance and repair this year. The lateral from Lost Creek to Kings Creek Meadows was cluttered with loose dirt and rock and considerable work was necessary on gutter lines and drainage culverts. A small crew of men was kept busy on this work during July, August, and September. The southwest sector of the Loop Highway was far more heavily damaged in this respect. Several large slides necessitated the use of a steam shovel in their removal and additional funds had to be authorized from the emergency reconstruction appropriation before this work could be completed. A fair-sized crew and a tractor and blade were kept busy during August and September on this unit.

Buildings.—Several buildings, notably the Warner Valley and Summit Lake ranger stations, needed minor repairs after the winter snows, and these were put in order during the season.

NATURAL FEATURES OF THE PARK

FISH AND GAME

Deer.—Deer seem to come to the park in increasing numbers yearly. While no actual count has been possible, more deer have been seen this year than any previous one. Even the mule-tail, most timid of them all, has moved out of his natural haunts into the haven of the park. The park is situated at too high an altitude to allow these animals to remain here throughout the entire year, but they are remaining later every year. At the same time the deer are fast losing their natural timidity and are not afraid of man to the extent they were when development was first started a few short seasons ago.

Bear.—Several black and brown bear have been reported as seen within the boundaries during the last year, especially in the Hat Creek region. These, however, are still timid and are not seen as frequently as smaller game.

Other animals.—Porcupines, pine martin, woodchuck, badger, and several other small animals inhabit the area. The coyote, bobcat, and lynx cat are present in only small numbers.

Birds.—Grouse and quail are making the park a breeding ground, especially since active administration and protection have been effected.

Fish.—Approximately 350,000 trout fry were planted during the year in the various lakes and streams throughout the park. At present German brown, Loch Leven, eastern brook, and rainbow abound in Juniper, Butte, Grassy Snag, and other lakes in the park as well as in various streams, as Grassy Creek, Hat Creek, Summit Creek, Kings Creek, and Warner Creek.

THERMAL PHENOMENA

Lassen Peak.—Lassen Peak continues to emit steam from the last crater. At one time steam was seen coming from 15 different places.

Bumpass Hell.—Geysers and hot springs were very active during the early spring. In June steam could be seen at evening pouring from this region from a point 5 miles distant.

Devil's Kitchen and Boiling Lake.—These are very active at present and seem to have lost none of the violence of previous years.

Sulphur works.—The sulphur, soda, and iron hot and cold boiling springs and streams at the sulphur works are in the usual state this year. One spring is noticed to have opened up at the edge of the roadbed which passes through this area.

COOPERATIVE FEDERAL AND STATE ACTIVITIES

The Bureau of Public Roads under the Department of Agriculture has been giving splendid cooperation in the matter of road construction being carried on in the park under their supervision. Local representatives of the Bureau of Volcanology, Geological Survey, stationed at Lassen Volcanic National Park have rendered valuable information and data regarding the geology of the park.

During the year one case was tried by the commissioner. This case resulted in the conviction of one of the road-construction contractors at work in the park and a total fine of \$130 was imposed.

In addition to these Federal bureaus splendid cooperation has been received from the State of California and its various departments. The fish and game commission has annually furnished upwards of 200,000 trout fry for stocking the various lakes and streams of the park. Close cooperation has also been extended by the county officials of the various counties surrounding the park.

MESA VERDE NATIONAL PARK

JESSE L. NUSEBAUM, Archeologist-Superintendent Mesa Verde National Park, Colo.

GENERAL STATEMENT

Mesa Verde National Park, an area of 80 square miles of greatly elevated tableland of outstanding and unique scenic beauty, embracing within its boundaries the most notable and best preserved aboriginal cliff dwellings in the known world, in addition to thousands of lesser archeological remains, was created a national park in 1906 to insure the permanent protection and preservation of the features within the area.

With the exception of 40 miles of unsurfaced park highway, 50 miles of improved, pioneer, and Indian trails, and 24 miles of telephone line, all develop-

ment within the park area until the past year has been centered at Spruce Tree Camp, park headquarters (post office, Mesa Verde National Park, Colo.), where housing and other facilities are available to care for all park visitors and park personnel, as well as administration, protection, maintenance, development, and other activities of the Government in this area. As necessity arises, minor development of housing facilities for park work is taking place in areas far distant from park headquarters.

The permanent field organization of 5, consisting of an archeologist-superintendent, a chief clerk-special disbursing agent, a clerk-stenographer, a chief ranger, and a permanent ranger, is increased during the open travel season to a maximum of 20 employees by the temporary appointment of 15 seasonal employees, principally ranger-guides, to handle open-season activities. General per diem employees vary from two to five in the closed travel period to a maximum of nearly a hundred during the period of heaviest maintenance and construction. Except for skilled help (tradesmen and foremen), Navajo Indians from the adjacent reservation form upwards of 90 per cent of the labor forces. As in the past, the administrative office force of two employees was moved to Mancos, Colo., the mail, rail, and telegraph head for the park, during the period of four to four and a half months when the roads were blocked with snow.

From the increase-of-travel standpoint, the past season has been the most disappointing in the history of the park. Disastrous floods and washouts occurring in July and August in this southwestern area at the very time when the peak travel of the park season was expected, either absolutely closed or seriously damaged approach roads in all directions from the park for periods up to several days at a time. This disrupted normal travel to the park very seriously. Mud conditions on the unsurfaced approach roads, as well as the park highways, were at times intolerable. With daily rains and limited sunshine or drying wind, no amount of maintenance could greatly improve conditions. The "Rain Gods" of the aboriginal inhabitants of this area, in complete control for the peak-travel period, obliterated all travel gain of the earlier part of the season and were apparently not content to let the "Sun God" rule, even intermittently, until the end of the first week in September.

Contractors are now nearing completion of the two important sections of new construction on the north entrance highway, each expecting to complete his project shortly after October 15 of this year. The second water catchment unit was completed to the extent of being placed in service in early January, with final completion shortly before June 30. Since July 10 there has been more than an ample water supply, and we will close the season with approximately 450,000 gallons of water in storage. Greatly improved telephone service has resulted from the reconstruction of 12 miles of the old line and the replacement of iron circuit with copper. The Prater maintenance camp is completed, and now road-camp stock, crews, and equipment are well housed and cared for. All other features of park work and service have been satisfactory.

Particularly gratifying is the fact that park visitors now realize that the scenic aspects of the area are equally as important to visitors as the ruins themselves and that greater emphasis should be given this feature of the park area. Up to the past few years park highways, by following a course of least resistance, naturally failed to take advantage of this important feature of road location. The new Point Lookout grade, now nearing completion, adds probably the finest and most thrilling view of all to be had from the park entrance highway—a fitting climax to an already spectacular entrance highway.

WEATHER

The travel year of 1928 was one of subnormal precipitation, both in snowfall and rain, and would normally be followed by a year of heavy snowfall, subnormal temperatures, and excessive rainfall. The snowfall for the past travel year was upwards of 100 per cent above the mean normal; temperatures were subnormal for the winter period, and rainfall during the travel period excessive. The cooperative weather bureau station maintained at park headquarters recorded a total precipitation of 9.30 inches in the 60-day period beginning July 9 and ending September 6, as contrasted to 1.46 inches precipitation in the 3-month period of June, July, and August of the season of 1928. The period of heavy precipitation during the present season coincided nearly to the day with the period of normal park travel to the park, and this condition is reflected in the travel statistics. Approximately one-half of the mean annual pre-

precipitation of 18.69 inches was therefore gained in this 60-day period, which I fear will go down in the annals of this park as the season of the "washout."

On the afternoon of August 30, in a 40-minute period, 2.35 inches of precipitation was recorded at park headquarters in a rain and hail storm which was of even greater intensity in the area just south of headquarters. Canyon trails were simply washed down the hillside for considerable stretches by the sheets of water that coursed down the very abrupt slopes. There has been no difficulty in gaining water for the headquarters area this season.

TRAVEL

From the travel standpoint the past season has been the most disastrous in the history of the park. With a mean annual gain in travel for the past seven-year period of slightly over 30 per cent per annum, and a gain of 40.6 per cent in travel in the season of 1928 as compared to that of 1927, the travel figures for this past season are truly disappointing, reflecting for the first time since the period of restricted travel during the world war, a definite loss from the previous year. A very severe winter, with snowfall averaging upward of 100 per cent above the normal mean for the area, was followed in July and August—the peak months of park travel—by a very protracted period of disastrous cloudbursts and floods that closed, for a period of one to four or more days at a time, the important approach roads to the park. The lighter and more continuous showers occurring between the heavier deluges reduced all but the more highly improved highways, including all within the park, to literal seas of mud. Dozens of cars, after plowing through seas of mud to the park boundary, turned back at the entrance when they found that the park roads were unsurfaced and that the ascent over the heavy grades was through deep mud.

Although every available piece of equipment, and the man, team, and power resources of the park were more or less constantly at work to improve conditions during this trying period, sunshine alone could materially help. I am surprised that as many visitors had the courage to push on and see the park area under the conditions. For the greater part of the 2-month period there was either very slippery or deep mud on parts of the highway system of the park, and at times the highway was just plain slippery mud throughout its entire length, to depths at some points that required the assistance of men and teams or tractors to snake out cars that slipped into the ditches or could not advance under their own power. Fortunately there was only one minor accident during the period, that of a girl employed in the park who was injured when she jumped from a skidding car.

With the comparatively light travel of a few years back, heavy precipitation or protracted precipitation was not as serious to the highways, as roads were less cut up when wet and cars were of the open, lighter type, and of considerably less power. The only road surface that can withstand present traffic under like conditions is of the surfaced type, and the surfacing of the park highway system can not be much longer delayed.

Under the conditions, it is particularly gratifying to note the wide distribution of the origin of travel to the park. All 48 States, the District of Columbia, Alaska, and Hawaii are represented, as well as 11 foreign countries. Of equal importance is the fact that never before in the history of the park have so many scientific and professional people visited the area, some coming for inspection of park educational activities, some to study within the area, others to discuss field and other problems, while some were vacation bound.

Travel report for period of October 1, 1928, to September 30, 1929

Total number of visitors using public camp ground.....			9,038
Total number of motorists using hotel.....			4,909
Transportation company cars.....	188	Motor cycle.....	2
Private cars.....	13,336	Miscellaneous.....	346
Second trips.....	623		
Horse.....	11	Total.....	14,517
Hiking.....	11		

There is no park in the system in which each visitor comes in more intimate touch and association with the Government personnel of the area than Mesa Verde. The ranger service here, in addition to regular duties, conducts all visitors to and through the ruins in groups, thus providing the opportunity of combining informative and educational service with regular protective duties. The service rendered by the ranger force and other park personnel during the past season has been especially commended by all visitors to the area.

PUBLIC UTILITY OPERATIONS

Licensed operators in the park area have bettered their service to visitors by additions to facilities, improvements in service, and better general supervision of details, all of which have resulted in more satisfactory service to those using the public utilities provided.

There is still an insistent demand for a modern hotel, conforming in architectural type to the now extended park headquarters buildings. For the past six months the Denver & Rio Grande Western Railway Co. has been considering such a plan, and in the course of this period has inspected possible sites for such an operation, conferred with the present operators as to sale of existing utilities, and has made formal application for a franchise to cover contemplated operations. The railroad company also proposes to operate an automobile transportation line to the park from its main line connections at Montrose or Grand Junction, or both, via the spectacular and scenic Durango-Silverton-Ouray Highway, in much the same manner as the Santa Fe-Fred Harvey detour operation is now functioning. Franchises of the present operators involved expire on the last day of this year. President Pyeatt and Vice President Taylor, of the Denver & Rio Grande Western Railway, accompanied by Director Albright, conferred with the superintendent as to the contemplated plan for development in mid-August of the past season, at which time definite conclusions were reached as to the main points involved.

CONSTRUCTION OTHER THAN ROADS AND TRAILS

Pending the conclusion of negotiations in connection with the establishment of a new camp and hotel operation here, the ranger checking control unit could not be satisfactorily located. By allotment, funds provided for this unit were made available for the construction of a stable in the industrial area for six head of stock, with ample provision for storage of forage for the closed winter period.

The addition to the unmarried rangers' quarters, where all temporary appointed male employees are housed, was completed in late June of this year. The addition, in the form of an outdoor sleeping porch conforming in type to the main structure, provides bunk and locker space for 12 additional men. Three sides of the open court are now surrounded by the outdoor sleeping porch.

The carpenter and furniture shop in the industrial area has provided long-needed work space for this department of park activity. The ice house, in the same area, completed late in the winter, has likewise filled a long desired need for the comfort of the personnel in this park. Part of the ice is frozen at headquarters, the balance being purchased from local ice houses maintained by residents in the Mancos Valley.

The second water catchment unit—the principal construction item under the past appropriation—was placed in service for the first time in early January of 1929, although protective fencing and final completion was not had until well into June. The reinforced concrete tank of 96,000 gallons' capacity, for pumped water from the old water system, was finally completed and covered under considerable difficulties because of heavy freezing at the time.

Distribution and supply lines for the new pumped water storage tank, as well as distribution lines from the second catchment unit, were completed in the spring of the year so that two types of water are now available in the major portion of the camp area—the soft rain and snow water for general purposes and the fresher and more potable old system water, for culinary and drinking purposes. Waterproofing of the concrete tanks, which was contracted under a 5-year guarantee, was damaged by frost, and the contractor has been notified that the ample water supply at the present time makes possible the immediate repair.

Reconstruction of 12 miles of telephone line was completed by the end of August. Replacement of the iron circuit by copper has greatly improved service to headquarters from the outside world. Delay in construction of the 6 miles authorized under the previous year's appropriation was necessitated by the fact that freight rate on less than car lot of poles prohibited completion of the 6-mile project within the funds available. By combining the two 6-mile projects, a greatly reduced rate was secured on pole delivery.

The Prater Road maintenance camp, composed of a stable, a storage shed for equipment, and a combined mess and bunk unit, has provided satisfactory housing conditions on the north rim section of the entrance highway.



unit, by providing satisfactory quarters for help, equipment, and stock will greatly promote the efficiency of the maintenance forces heretofore quartered in tents, or in the open, in the high country.

Construction as yet has not been initiated on the checking ranger quarters at the north entrance since State and county officials have not yet reached a decision as to location of the short, connecting road between the entrance and the main State highway.

Ranger quarters authorized for the headquarters area can not be constructed until decision is reached as to final location of the contemplated new hotel development which will presumably be decided by the end of this calendar year.

The small allotment for the enlargement of the camp ground is held in abeyance for the same reason, since future development will be controlled to a great extent by the final location of the contemplated new development.

ROAD CONSTRUCTION—CONTRACT AND FORCE ACCOUNT

Under the cooperative agreement of the National Park Service and the Bureau of Public Roads, for the improvement of roads in the national parks, two contracts were let in 1928 for new construction on the north entrance highway. Shields & Flatt, contractors on projects 1-A, north entrance section (reconstruction of present road), and project 1-B, Point Lookout section (new construction), in all, 2.58 miles, are nearing completion of their project. Break-down and mechanical repair on the two steam shovels used in this contract, as well as badly worn trucks and other equipment, have seriously slowed up progress on this combined contract. Weather conditions have likewise been responsible for considerable delay. From the scenic standpoint, the Point Lookout section of this contract will surpass in commanding view probably any other section of the north entrance highway, and at the same time provide a double travel width highway of easy grade and excellent alignment in reaching the crest of the mesa. Shields & Flatt expect to complete their contract about October 15. No surfacing of any type is included therein. This contractor will show a loss on completion of the project.

Project 1-D, Prater Canyon section, of all new construction and 2.39 miles in length, is rapidly nearing completion. The Pioneer Construction & Engineering Corporation, Denver, Colo., contractors, has made excellent progress from commencement of work on this project, and with excellent equipment and fine organization will show a good profit on the job, even though they have encountered considerable more rock excavation than originally estimated. Excessive rains during the present summer have hampered the work to some extent, but fortunately the contractor was able to shift his operation into a rocky area during the period of the worst storms, thereby continuing with construction. This contractor expects to have his project ready for final inspection by October 15. Both projects will be opened to park travel immediately on completion and acceptance.

During the coming year visitors can be assured, when roads are dry, of a high-gear highway from the north entrance to park headquarters for the first time in the history of the park, as these two projects, involving the only new construction on the final location line, have removed for all time the excessive grades on the old Point Lookout and Prater grades which will be abandoned with the completion of these projects.

Force account work by park forces under my direction, and in cooperation with the Bureau of Public Roads officials, is accomplishing grade rectification, widening, alignment, and drainage work on the Knife Edge section intervening between these two contract projects. In addition, park forces have apparently stabilized one slide area at the east end of the Knife Edge and have well advanced the work on a second slide area in that same area. It is believed that the methods worked out in apparently stabilizing the first slide area will satisfactorily handle the few remaining like areas on the Knife Edge road. The \$10,000 for force account work on the Knife Edge road for the current year will care for approximately one-fourth of the work to be accomplished in attaining a roadway comparable in design and construction to that of the contracted project.

PARK MUSEUM

No single activity in this park has received more favorable public approval and encouraging support than the park museum development, made possible almost in its entirety by friends of the park through gifts and financial support.

Each year the extent and scope of the collections are enlarged by the annual winter excavations, also supported by a park friend, and yearly more information is accumulated thereby to better tell the story of the aboriginal inhabitants of this area. The reference library is likewise gaining and growing from year to year.

Excellent progress on preparation of new exhibits, either on hand in storage, or gained through this winter's excavations on the west side of the park, made possible an increase of six additional cases of archeological exhibits for the present season's display. There are now on display in the museum 14 large wall-type cases of archeological exhibits, mainly gained from the park area; 4 like cases of ethnological exhibits, representing arts and crafts of the present-day Indians of the reservations adjacent to the park area; and 1 case devoted to geology. The above exhibits, together with minor displays of other materials, now occupy all available space in the present museum building, with the exception of that portion of the largest room which has been temporarily partitioned off to provide storage and preparation space. It may be stated at this time, without fear of denial, that the largest and most comprehensive exhibits of the archeology of the Mesa Verde National Park open to public view are now housed in the park museum, and this is as it should be.

Never before in the history of the park have so many scientists visited the area. Museum directors, curators, archeologists, ethnologists, paleontologists, geologists, botanists, as well as those working in associated sciences, have been coming and going all season, some coming for serious study in the area for several weeks at a time, others for inspection of park educational and museum activities, a few purely on annual vacation, while many from the archeological field in the Southwest have come to discuss their field problems, as their operations on the public domain, under the jurisdiction of the Department of the Interior, is regulated under permits granted by the Secretary on applications previously referred to this office for consideration and report.

EDUCATIONAL ACTIVITIES

Each year the direct and accumulated information of this area is presented to park visitors in better manner and form through the three main agencies developed for this purpose: A specially selected and instructed ranger-guide service which conducts all visitors to and through the major ruins; the park museum, with its associated activities, which present for study and enlightenment comprehensive collections of materials and artifacts not available to the visitor otherwise, together with the accumulated information bearing thereon; and lastly, the informal evening camp-fire talks conducted by the chief ranger and other rangers and myself covering the broader aspects of the work of the National Park Service, the prehistoric cultures of the Southwest, and other pertinent facts. Concluding the camp-fire talk, the Navajo Indians from the adjacent reservation give a series of songs and dances. Through the very mode of operation, all visitors come in contact with the informative ranger-guide service and the park museum, and few fail to attend the evening camp-fire talks.

Temporary park rangers appointed for a few months of the heavy-travel period are invariably interested in some particular branch of natural science, and every encouragement has been given such employees to undertake the accumulation of additional information of the area in the lines in which they are primarily interested, so that other members of the ranger force may be better prepared to handle information of the park area.

ARCHEOLOGICAL INVESTIGATIONS

Abnormal snowfall and extremely cold weather during the winter period prevented the departure of our yearly archeological expedition, which is supported by a park friend, until mid-April, a month or six weeks later than normally. For this reason, since only two weeks could be spared from other work, camp was established far south on the west rim of Wetherill Mesa, on the west side of the park within a short distance of ruins 16 and 11, where there still remained previously excavated debris from the early pot-hunting expeditions to this area that we were desirous of carefully troweling and searching in the hope that missing portions of bowls and jars recovered during the previous season in like work might be found. This work occupied the first week of effort under very trying conditions, and was singularly suc-

cessful in most cases, it having been found on our return to headquarters that, in addition to finding the missing sherds for many pieces of pottery in process of mending and restoration, we had likewise recovered, in the process, practically all the fragments of what has been considered by many archeologists since preparation, the finest, black on white, seed or kiva jar ever found in the whole Southwest.

Like work in ruin No. 11 was less successful than in the previous year. But few additional fragments were found of the decorated but unfired large bowl and water olla recovered in part during the previous season.

Early pot hunters had completely wrecked the few low walls and rooms in a deep, small cave just below ruin No. 12. The area previously worked over was carefully retroweled for further evidence of missed and broken material with little success. Two previously unexcavated, depressed areas well toward the front of the cave proved to be typical Mesa Verde kivas of the earlier type, that were presumably abandoned to the elements while the cliff dwellers were still inhabitants of the area. Four child burials and one adult burial were found in the north kiva at varying levels well above the floor, all without accompaniments of any kind. A complete record, photographic and otherwise, was kept of the progress of the work.

Park museum exhibits have benefited handsomely from this tedious process of recovering the discarded sherds of early pot-hunting expeditions, followed by a second tedious process of matching, mending and repair in preparation for exhibit. This method constitutes the only possible means of gaining representative collections from the west side cliff dwellings which were so repeatedly excavated long before the area was created a national park.

WATER SUPPLY

Even with excessive snowfall during the winter period, the gain from the two catchment areas with spring melting was comparatively light. Early this spring very heavy, drying winds coming from the Navajo Reservation evidently evaporated much of the water content from the snow, the evaporation progressing at greater speed than the melting process, thereby removing from catchment areas more than half of the water content that the Weather Bureau records would indicate was conserved there. At the end of June the total available water supply in storage was less than 104,000 gallons.

Beginning June 9 and continuing to the period of September 10, 9.48 inches of rainfall was recorded at park headquarters, thereby insuring far more than an ample supply for this travel year. During the same period all available water was pumped to the lower reinforced concrete tank for storage of water from the older system. On September 10, 450,000 gallons of water of the two types were in storage, each of which is supplied separately to the main outlets within the headquarters area, thus providing an absolutely soft, general purpose water from the catchment units, and a fine, potable water from the old system, less flat, for culinary and drinking purposes. Much time has been devoted during the past season in study of future water development here to care for the greater needs of the immediate future when a greater and more modern camp development will require considerable greater volume of water for operation of modern conveniences and the sewage disposal system. Estimates and justifications for the 1931 fiscal year are in support of a deep drilling test water well as a means of caring for future requirements, based on the success of the Shiprock water well and wild-cat drilling in areas adjacent to the park in which water was encountered.

PUBLIC CAMP GROUNDS

Because of the absence of water, except in the park headquarters area, but one public camp ground is maintained. Here approximately 60 per cent of the visitors make their temporary homes during their stay in the park. The camp ground is located under the piñon and juniper cedars on the rim of Spruce Canyon within a few minutes' walk of other headquarters' attractions. Water is piped to convenient outlets, firewood regularly distributed, and sanitary facilities provided. The comfortable log community house has proved an added asset. The three buildings within the area are now electrically lighted. A ranger is assigned for patrol of the camp, which is maintained in scrupulous order at all times.

Extension of the camp grounds under a small fund provided in the 1930 estimate will be held in abeyance pending final decision as to the location of the greater hotel and camp development here.

MAINTENANCE

Early spring maintenance of roads and trails, together with a lighter maintenance required until about July 7 when the excessive precipitation began, kept these features in excellent condition. From July 7 on the excessive precipitation of the following 2-month period made the maintenance problem a serious one, in view of the fact that the period of this excessive precipitation corresponded nearly to the day with the period of heaviest park travel.

The road surface over the major portion of the road in this national park is composed of disintegrated shale, clay, adobe, very fine red soil, and gumbo, all of which become extremely slippery and treacherous when wet, and cut deeply under traffic when in this condition. The period of rainfall this season was so continuous that there were days at a time when maintenance work was largely confined to shaping up literal seas of mud. On the old Point Lookout grade and on the Knife Edge the depth of the mud reached such proportions that cars could not move through it on their own power at times. Mud was graded from this section of the road to gain better footing, and crushed sandstone applied to support traffic. Sunshine and drying breeze alone made it possible to reshape the roads during the short, dry periods within the long, wet spell.

A very severe cloudburst occurring in the headquarters area on the afternoon of August 30 practically obliterated the main portions of the first 4 miles of the Rock Springs Trail, this storm being the most severe, with one exception, of any to visit the park headquarters area within the knowledge of the oldest inhabitants. Precipitation for the 60-day period from July 9 to September 6 at park headquarters totaled 9.30 inches, approximately one-half of the normal year's precipitation. In the higher north rim country normal precipitation is 50 per cent heavier than headquarters, which is twelve to fifteen hundred feet lower in elevation. Maintenance crews during this period were more continuously occupied in maintenance work on roads than at any period before in the park's history. Until the park highway is surfaced, the cost of maintaining the present earth roads must normally increase in direct proportion to the increase in traffic, and excessively in wet seasons. All other features of park maintenance work have been kept current during the year.

JURISDICTION OVER PARK LANDS

With the assumption of exclusive Federal jurisdiction over the park area by the Government, James M. Dalton, of Washington, D. C., was appointed United States commissioner for this area, reporting to Mancos in February of this year. He moved from Mancos to the park when the park office was moved back for the travel year, resigning on August 15 to return to his family in Washington.

The presence of a United States commissioner in this national park has had the desired effect in the matter of enforcement of rules and regulations. There were but few violations during the period, and the commissioner handled these cases with promptness and dispatch.

FOREST INSECT CONTROL

Although up to this time officials of the Bureau of Entomology of the Department of Agriculture have not yet arrived to make their contemplated inspection of the infestation and disease in the forest cover, it is encouraging to report that there is less evidence of new infestation and killing than during the past year. Funds to the extent of \$1,200 are available at the present time for protecting the forest cover. The method to be used will be that recommended by the Bureau of Entomology following their investigations here.

FLOWERS AND WILD ANIMALS

Never in the history of the park have the flowers put forth such a display as during the past season. Excessive snowfall during the winter prepared the way for marvelous exhibits of blooming shrubbery and spring flowers at the commencement of the season. Drought during the month of June seriously retarded flowers that would normally be at their best at that time, but the excessive precipitation of July and August developed a marvelous display that literally blanketed the major portion of the more gentle slopes and valleys of the north portion of the park and the more open areas in the timbered

portions. The heaviest concentration occurred in the head of Morefield Canyon, nature's answer to the complete exclusion of cattle from this area for the past four years, following a period of overgrazing.

Deer are more abundant than ever before, and during the early spring and the late fall were noted by visitors in the area immediately adjacent to park headquarters, as well as on the north entrance road.

FOREST FIRES

But 3 forest fires occurred during the period, 2 just outside of park borders and 1 within. One to the west of headquarters on the Ute Reservation was started by Ute Indians and burned over an area of approximately 7 to 10 acres. The fire on Park Mesa was caused by lightning which smoldered in a shattered tree for five days before fanned to flame by a heavy wind. The area burned over in this case, before the fire could be put out, was $1\frac{3}{4}$ acres.

CONCLUSION

In view of road conditions during the normal peak months of travel by reason of excessive precipitation, it is recommended that every effort should be made to accelerate the road-improvement program of this national park so that surfacing of the park highways may be accomplished in the shortest possible time.

MOUNT MCKINLEY NATIONAL PARK

HARRY J. LIEK, Superintendent, McKinley Park, Alaska

The outstanding developments of the year in Mount McKinley National Park were the construction activities around headquarters, the road building, and the increase in travel. Park headquarters construction is well under way, with the completion of a warehouse, ranger quarters, barn, and feed cache, and the installation of the sewer, water, and electric systems. The superintendent's residence will be ready for occupancy about October 15.

WEATHER

The weather during the winter months and well up into the spring was very cold, but owing to the heavy snows which came early in the fall the ground was protected to a certain degree and did not freeze as deep as it did in former years. The coldest day of the year was on December 12, 1928, the thermometer reaching 31 below zero, and the warmest day was June 24, 1929, when it reached 84. The rainfall for the year was 15.96 inches.

ROADS AND TRAILS

Road construction in the park is being done by the Alaska Road Commission under cooperative agreement. It is the policy of the commission to build by stage construction, opening a one-way passable road to start with and later widening, surfacing, and straightening as traffic demands.

This procedure involves heavy maintenance and in the long run makes the construction cost of the road for the type desired much more expensive than if the final type were constructed at one time. The roads have been in better condition this year than ever before, and there have been fewer delays to traffic on account of being mired in the mud.

Thirty-eight miles of main road from the railroad toward Mount McKinley are in service. The work this season consisted of maintenance and improvements of the main road from the depot to mile 29; the building of a new road from mile 29 to mile 31, including the construction of a pile trestle across the Tatlanika River 400 feet long; improvement and maintenance of road from mile 31 to mile 38; and opening up and preliminary work from mile 38 to mile 43.

The travel into the park this year shows a 29.4 per cent increase over previous years, possibly due to the splendid publicity given to the park by people who have visited it. Although there are some who regret the fact that the highway is far from completed and a closer view of Mount McKinley impossible at this time, unless going to the heavy expense of outfitting with horses and riding into the mountain, visitors appreciate what is being done to open the park for their use and all express the desire to return at some future date when the highway is completed and a lodge established at the foot of Mount McKinley.

PUBLIC UTILITIES

The McKinley Park Tourist & Transportation Co. is constantly expanding and adding to its equipment and housing facilities in order to meet the requirements of the increased tourist travel, and can now take care of 100 guests at a time. Nothing of a permanent nature is being erected as yet, owing to the fact that the camp will be abandoned when the road is completed to Copper Mountain, where it is planned to build a modern hotel.

During August a party consisting of T. C. Vint, landscape architect of the National Park Service; J. L. Galen, president of the Mount McKinley Park Tourist & Transportation Co.; and the park superintendent were in the Copper Mountain district, choosing a suitable site for the proposed hotel to be constructed upon the completion of the road to Copper Mountain in 1931. As soon as this hotel is completed plans contemplate the erection of a hotel at McKinley Park station, which is to be made a division point on the Alaska Railroad to replace the present division station at Curry, Alaska. This should increase the travel into the park by making a night stopover and thereby giving the tourists the advantage of taking in the park during the long summer evenings without necessitating a stopover of 24 hours, as is now the case.

WILD ANIMALS

The wild life of all kinds in the park is increasing rapidly in numbers and is becoming more tame each year as more tourists are seen and the fear of human beings lessens. The number of sheep is estimated at about 15,000 and the caribou, which migrate north during the bad fly season and return to the park boundary for protection when the hunting season starts, at about 50,000.

Foxes can be seen all along the highway and even the grizzly bears seem to have no fear of man, as a person can walk up to within about 40 or 50 feet of one.

Four wolves, which are classed as predatory animals, were killed during the season.

TELEPHONE SYSTEM

The park telephone system consists of 2 miles of No. 9 copper metallic circuit connecting headquarters with the Alaska Railroad system, giving connection with all points on that line. There are 22 miles of duplex insulated wire between headquarters and Sanctuary River. This line also serves the park transportation company and the Alaska Road Commission. It is a temporary line and mostly lies on the ground. Much trouble has been experienced during the summer months by animals getting tangled up in the wires and breaking them and also by small rodents chewing the insulation off wires and thus causing the line to become grounded.

PROTECTION DEPARTMENT

The permanent personnel of this department consists of Chief Ranger Fritz A. Nyberg and four rangers. Regular and special patrols are made throughout the fall, winter, and spring seasons for the observation and protection of wild life. Other activities have consisted of predatory-animal hunting and repairs and maintenance to buildings and equipment, this in addition to the information and guide service extended to tourists during the travel season.

MINING AND PROSPECTING

The bill creating the park carried an item allowing prospecting within the boundaries. Though considerable prospecting has been done in the past, there is very little activity in this line at the present time.

MOUNT RAINIER NATIONAL PARK

O. A. TOMLINSON, Superintendent, Longmire, Wash.

ADMINISTRATION

There was no change in the permanent park organization, which is divided into six administrative departments—namely, administration, protection, maintenance, construction, educational, and electrical. The total permanent per-

sonnel is 18 members. During the travel and working season the administrative force was increased by 2 temporary clerks and 2 temporary telephone operators; the protection force by 16 temporary rangers; the educational department by 3 ranger-naturalists; the maintenance and construction department by 140 skilled and unskilled laborers; and the electrical department by 2 linemen. The maximum number of employees of all classes on the pay roll at any one time during the past year was 165.

Five cases of violations of park rules and regulations were taken before the United States commissioner for trial, and there were five convictions and sentences imposed, totaling \$120 in fines. In addition to the cases taken before the commissioner for trial, 230 individuals were warned for minor infractions of traffic and other rules.

Appropriations for the operations and maintenance of the park totaled \$118,890, of which amount \$91,370 was for general administration, protection, and maintenance, and \$27,520 for construction of physical improvements. To this amount \$2,429.49 was allotted to cover emergency reconstruction work and forest-fire fighting. The sum of \$72,035.46 was allotted to the park for road and trail development during the year.

Revenues were collected during the 1929 fiscal year and deposited to the credit of miscellaneous receipts of the General Treasury as follows: Automobile and motor-cycle fees, \$32,898; operators' fees, \$2,000; miscellaneous, \$4,988.17; totaling \$37,886.17. This is an increase of \$5,840.67, or 18 per cent, over the collections of the 1928 fiscal year.

WEATHER

Weather conditions during the fall and early winter months were normal but during January, February, and March the temperatures averaged from 6° to 10° colder than is usual for that time of the year. Due to this colder weather the snow accumulated to a greater depth than for the past several years at elevations below 4,500 feet. Cold and rainy weather during the spring months retarded the melting, with the result that the snow remained until late in the season. Weather conditions were generally severe throughout the Cascade Mountains and the Puget Sound and there was more than a normal snowfall. This condition affected travel to the park because snow sports could be enjoyed without the necessity of making the trip. Following a backward spring, July and August were unusually dry and the long periods of low humidity caused the worst fire hazards experienced for several seasons. The hottest day of the year, at park headquarters at an elevation of 2,732 feet, was 87° on July 28 and the coldest day of the year was zero, which occurred on January 23, 1929.

TRAVEL

Travel to Mount Rainier National Park for the year ended September 30, 1929, showed a slight decrease over the record year of 1928. Travel during the 1929 season totaled 217,783 people and 51,998 private cars. This decrease is attributed to the late date at which the contractor started paving operations on the State approach road just outside the Nisqually entrance to the park, which necessitated a series of short detours which were in very poor condition the first half of the summer season. While this construction work did not affect the out-of-State travel it was responsible for a material decrease in the travel from our near-by cities. A substantial increase was shown in travel at the other three park entrances.

The largest travel day in the history of Mount Rainier National Park was on September 1, 1929, when 8,468 people and 2,022 cars registered at the four entrances, the former record having occurred on August 31, 1924, when 7,759 people and 1,914 cars registered.

Summary, 1929

Methods of transportation	Nisqually entrance		White River entrance		Carbon River entrance		Ohanapecosh	Total	
	Cars	People	Cars	People	Cars	People	People	Cars	People
Private autos.....	41, 565	163, 811	7, 315	28, 305	3, 062	11, 203	-----	51, 942	203, 319
Stages.....	1, 139	11, 475	-----	-----	-----	-----	-----	1, 139	11, 475
Motor cycles.....	56	69	-----	-----	-----	-----	-----	56	69
Miscellaneous.....	-----	-----	-----	-----	-----	-----	2, 920	-----	2, 920
Total.....	42, 760	175, 355	7, 315	28, 305	3, 062	11, 203	2, 920	53, 137	217, 783

PROTECTION DEPARTMENT

The permanent personnel consists of a chief ranger, assistant chief ranger, and 6 park rangers, and during the summer months was increased by 16 temporary park rangers.

Winter activities.—Regular and special patrols were made throughout the fall, winter, and spring in the interest of game protection and for the observation of the natural features and wild life of the park. Other activities consisted of repairing station buildings, patrol cabins, telephone lines, trails, furnishing information, and directing traffic.

Summer activities.—Fire patrols, traffic regulation, information, entrance checking, and compilation of travel statistics, camp-ground management, police duties, and a wide range of duties connected with the serving of park visitors were carried on.

Forest fires.—Twenty-one forest fires were discovered and extinguished by the ranger force. Fifteen of the fires were caused by lightning during an electrical storm on August 2. Two of these were of consequence. One which occurred in October, 1928, on Klapatche Ridge from burning on the right of way on the West Side Highway destroyed 200 acres of timber. Another fire which occurred on the 2d of August, 1929, burned into the park from a large fire set by lightning in the Rainier National Forest, adjacent to the east boundary near the southeast corner, destroying 80 acres of timber. None of the other fires exceeded 3 acres in extent. Sixteen of the fires were caused by lightning, four from burning on right of way during road construction, and one from a discarded cigarette. As this report is written (August 31), one fire near the east boundary is still burning on an area of about 100 acres.

J. B. Coffman, National Park Service fire-control expert, made a careful inspection of the forest cover during July and August and assisted the chief ranger in the preparation of a fire-control plan for the prevention and suppression of fires by the ranger force. Mr. Coffman assisted the National Forest and Park Service fire forces in combating the fire which burned from the national forest to a short distance inside the park.

Fish planting.—Through the cooperation of the United States Bureau of Fisheries furnishing eggs from Yellowstone National Park and the hatchery facilities furnished by the Pierce County Game Commission, 274,500 rainbow, eastern brook, and Montana blackspotted trout were planted in park streams during the fall months.

Trail maintenance.—The park trail system, totaling 242 miles, was maintained under the direction and supervision of the chief ranger and district rangers. Due to lack of funds only 175 miles of the trail system could be opened up and repaired for horse travel. On the remainder of the trail mileage only sufficient of the down timber was removed and the worst washouts repaired to permit passage of pack animals in case of emergency or for fire-fighting purposes.

Forest guard training camp.—All permanent and temporary rangers attended the fire guard training camp during the last week in June, which was held on the Cispus River in the Rainier National Forest with the Forest Service.

Accidents.—The most serious accident in recent years occurred on July 2 when a summit party consisting of three visitors and two assistant guides under the leadership of Summit Guide Leon Brigham, of the Rainier National Park Co. guide department, lost their way in a blizzard and fell into a crevasse at the 13,000-foot elevation while returning from an ascent of the mountain. Assistant Guide Forrest Greathouse and Mr. Edwin Wetzel, of Milwaukee, Wis., lost their lives. The four other members of the party were more or less seriously injured but all recovered. Park Ranger Charles B. Browne, who went alone and improperly equipped to the aid of the summit party and later led several attempts for the rescue of the bodies of Wetzel and Greathouse, was cited for heroism and exceptionally meritorious service.

First-aid training.—Through the cooperation of the Pacific Telephone & Telegraph Co. officials two park rangers were given the complete Red Cross first-aid training course by the telephone company safety engineer. These men successfully passed the examination and were issued a certificate qualifying them as instructors by the Red Cross authorities. These men acted as instructors for the other rangers and permanent employees who took the first-aid training course during May and June. All permanent rangers are now qualified and several of the other employees have also completed the course.

The training of the rangers and other employees in first-aid work has already been of much benefit to the personnel. During nine months of the year there is no medical service whatever in the park and the nearest doctor resides 15 miles from Longmire Springs and is often not available.

NATURAL FEATURES AND WILD LIFE

Observations by the park naturalist, rangers, and other employees indicate that nothing of an unusual nature occurred to the natural features or wild life during the year.

Glaciers.—The glaciers continue to recede according to size, location, and whether active or inactive, from 30 feet to the large north-side glaciers to around 100 feet for the smaller south-side ice fields. Measurements of the Nisqually Glacier show that this one retreated 84 feet during the past year.

A new trail, which was completed to the snout of the Nisqually Glacier from the improved parking area at the bridge on the Nisqually Road, has greatly increased the inspection of the ice and the canyon by visitors. This trail offers the most strategic point so far developed for the study of both glacial phenomena and the geological history of the mountain formation. This glacier has cut its canyon at this point entirely through the eruptive rocks of the old volcano and many feet down into the granite rocks of the old plateau underlying the mountain. The point of contact between the basalt cliffs standing high along this canyon and the granite beneath is exposed and in plain view from the trail, which leads up over the moraine to the snout of the glacier where the river issues from beneath solid ice 400 feet thick.

Several marked changes were noted in the great crevasses along the route to the summit on the upper courses of the Nisqually and Ingraham Glaciers, necessitating some changes in the summit route.

Conditions in the crater at the top remain unchanged. Sufficient heat still issues forth from the old crater to produce ice caverns and grotesque ice forms about the edge.

Flora.—The flowers of the park were good, the season being favorable. A late spring was followed by abundant sunshine so that the Hudsonian Zone, the region of richest flower distribution, maintained its brilliant hues throughout the season. A few forest fires did some damage to the trees in limited areas. The only noticeable ravages of the insect pests were the beetles in the white pine. These trees are few in number and occasional in distribution so that these beetle inroads have made little effect upon the general forest appearance.

Animals.—All wild animals are apparently thriving and most of the species are increasing. Bear, deer, and goat are frequently seen and are enjoyed by visitors. Cougar have apparently decreased considerably, as there were only two reports received indicating their presence in the park. It is believed that the coyote is also less numerous, where bobcat and lynx are apparently holding their own. The following is the estimated number of large wild animals in Mount Rainier National Park: Deer (Columbia Black Tail) 550, goat (White Mountain) 275, bear (black) 275, wolf (timber) 10–20, cougar (mountain lion) 6–12, eagle (bald and golden) 20–40.

Other small animals—marmot, cony, fox, squirrel, chipmunk, weasel, mink, and marten—are widely distributed throughout the park but no reliable estimate can be made of their numbers. Fox are noticeably increasing about Paradise Valley. There are still a few beaver found in the park.

Bird life.—No appreciable change was noted in the bird life of the park. The grouse, especially ptarmigan, had a good season. Many young chicks have been reported from various sections. Predatory birds, such as hawks and eagles, are not numerous.

MAINTENANCE DEPARTMENT

The general foreman, Frank Akehurst, supervises all equipment, road, building, camp ground, sewer system, water supply, garbage-disposal plant, and other miscellaneous maintenance work in the park. He also cooperates with the chief ranger and park electrician in the maintenance of trails and telephone and electrical systems.

General maintenance work done during the year covered repair and upkeep of 34 miles of automobile roads, 175 miles of trails, 150 miles of telephone lines, 4 large and 4 small public auto camps, 9 patrol cabins, 5 permanent

ranger stations, 3 summer ranger stations, 10 cottages for employees, 1 administration building, 1 temporary museum, 2 community buildings, 7 utility buildings, including warehouse, repair shop, equipment sheds, bunk house and mess hall, and 27 other miscellaneous structures, such as comfort stations, cabins for temporary employees, and small tool sheds. All of these facilities were maintained in serviceable condition. Practically all of the maintenance funds are insufficient to provide for all of the upkeep and repair necessary to maintain structures in first-class condition. Due to heavy snowfall and other climatic conditions, deterioration is rapid.

The chief mechanic and his assistants repaired, overhauled, and reconditioned the park machinery, equipment, and tools as required. Due to the wornout condition of a greater part of the park transportation equipment, which includes heavy and light duty trucks, tractors, road graders, steam-shovel, etc., nearly all of which was received from the surplus war service stock, the maintenance expense for this work is increasing each year. Each season sees greater delay in obtaining parts and increasing difficulty in maintaining the obsolete equipment.

EDUCATIONAL DEPARTMENT

This department is under the direction of C. Frank Brockman, who was acting park naturalist from September, 1928, to July 16, 1929, when his appointment as park naturalist became effective. During the months of July and August he was assisted by three temporary ranger-naturalists—one each at Longmire, Paradise, and the White River public camp.

Lecture service.—Lectures during the summer season were conducted at Paradise Valley (15 minutes were allotted on the public utility operator's program) each night, at Longmire, four nights a week, and at White River public camp twice each week, and were attended by 24,895 persons. In addition to the regular lectures several camp-fire and informal talks were given by the naturalist and his assistants to special groups. The naturalist also gave several talks to special groups outside the park.

Guide service.—During the summer season regular nature hikes were conducted in Paradise Valley twice daily; at Longmire, four times a week, and at White River public camp, twice a week. A total of 3,871 persons attended the regularly scheduled guide field trips. In addition numerous special guide field trips were conducted at each of the three nature guide centers for interested groups seeking special information and for special parties with a limited time at their disposal. The number of people conducted on the special trips was 525. Several special long hikes were conducted to scenic or other interest points to limited groups, totaling 129.

Nature trails.—Two trails each were established and maintained at Paradise, Longmire, and the White River public camp on which the flowers, trees, etc., were tagged for easy identification. No facilities were available for checking the number of people who visited these trails but it is believed that a greater number of people enjoyed them than any previous year. Many complimentary remarks which indicated much public appreciation of this work were received.

Publications.—Nature News Notes were published monthly during the winter and biweekly during the summer season. The educational department prepared and published a park bibliography and the naturalist edited and prepared drawings for a new set of trail guides for each of the four park districts visited by large numbers of people. Work was started on the preparation of a park manual of information and a history of the park. It is the intention to assemble all possible technical and historical information of the park for compilation into a volume of encyclopedia form.

Research and technical cooperation.—Cooperation was begun with the Pacific Northwest Experiment Station in phenological observations. The naturalist also aided in the collection of certain technical trees and flowers for use by several universities and he began a collection of botanical specimens of trees and the preparation of a park herbarium.

Through the lectures, publications, nature trails, and guide parties approximately 90,000 people were furnished information by the educational department during the year.

ENGINEERING DEPARTMENT

This department is under the direction of Acting Resident Engineer R. D. Waterhouse, assigned to this park from the chief engineer's office during the summer construction season for the past three years. All new construction and improvements of buildings, trails, public auto camps, and minor road projects have been under his supervision. The following projects were constructed this year:

Buildings.—Warehouse, 112 by 30 feet was erected at Longmire. It is a frame building with 1 by 12 inches drop siding and shake roof, supported on a stone foundation. It was completed and occupied on July 27, 1929. A standard 4-room cottage, 28 by 38 feet, was built in the residential area at Longmire. This building is a frame structure with shake siding and roof and supported on a rock foundation. A woodshed, 14 by 20 feet, was provided and the building was completed on September 5. The old warehouse building, 30 by 60 feet, was moved to a new utility site and remodeled to provide dormitory accommodations for employees on duty at headquarters. Four single rooms, a living room, a shower bath, and toilet were provided on the ground floor. The upper story is one large room. A log checking station, 44 by 31 feet, with an ell extending over the road, will be constructed this fall at the new White River entrance. A garage and equipment shed, 80 by 26 feet, with 1 by 12 inches drop siding and shake roof, will be constructed this fall for housing equipment at the new White River entrance.

A stone comfort station made of native materials, 14 by 22 feet, with toilets for men and women and containing waterproof concrete chemical tanks, was completed at Panorama Point on the Skyline Trail on August 15. The building fits into the surroundings very well and is much appreciated by hikers and saddle parties who travel the Skyline Trail. The mess hall and bunk house at the Government camp in Paradise Valley, 72 by 18 feet, and 60 by 18 feet, respectively, of frame construction with 1 by 12 inches drop siding and shake roof, were reconstructed. Similar buildings constructed last year were completely demolished by the snow during the winter, making it necessary to request funds from the emergency reconstruction fund for rebuilding them. A rock shelter cabin, 18 by 24 feet, was constructed on the Northern Loop Trail near Lake James.

Trails.—The following trails were improved: Glacier Bridge to Nisqually Glacier, 0.6 mile, widened, graded, and surfaced; Paradise Trail, 2 miles, widened and graded; Yakima Park Trail, 2.5 miles, widened and improved; Reflection Lakes to Cowlitz River, 5 miles, reconstructed and improved. A rustic log bridge, 35 feet long by 5 feet wide, was constructed over the Muddy Fork of the Cowlitz River where the Wonderland Trail crosses the Box Canyon. Two trail hubs or starting centers built from rustic materials were placed near the Community House and Paradise Camp in Paradise Valley for the guidance of hikers and stimulation of trail interest.

Roads, minor projects.—About 600 feet of road approaching the new administration building at Longmire was regraded and a curve improved after moving the old administration building. Eighty-three feet of iron culvert were used for draining this piece of road. The 1,300 feet of road graded in 1928 to connect Paradise Inn with the new hotel site was surfaced with crushed rock. Stone head walls for the 48-inch concrete culvert were built.

Camp ground development.—At Longmire the 1,500 feet of new loop road graded last year and also parts of the other camp ground roads were constructed. At Paradise Valley a total of three-fourths of a mile of camp ground roads was surfaced with finely crushed rock. This surfacing greatly improved the appearance of the camp roads as well as riding qualities. A new pole line one-half mile long for lighting the camp grounds was constructed.

Sewer extension at Paradise Valley included the laying of 800 feet of sewer pipe, a spray system, and a syphon to care for the effluent from the septic tank. This extension was necessary to prevent contamination of the creek draining into the Nisqually River. Four hundred feet of lateral sewer pipe were laid to connect the ranger quarters in the community house.

Yakima Park development.—All of the funds, \$9,000, available were used to start construction of a water-supply system. Ten thousand four hundred feet of trench for water mains was dug and 7,000 feet of 6-inch wood pipe was purchased and laid. The topographic mapping of the area was completed and data on the water supply, sewage-disposal system, and power sources were gathered.

Road oiling.—Twelve miles of the Nisqually Road, from the entrance to Glacier Bridge, were oiled for dust prevention. The oil used was too heavy for the thin top surfacing, and it failed to penetrate sufficiently to prevent crust- ing and breaking up. As a result the road became quite rough and was difficult to maintain.

Landscape work.—Thomas C. Vint, chief landscape architect, visited the park four times during the year to assist with the planning of road, building, trail, and other developments and in the preparation of a complete set of development plans for the Yakima Park area. His assistant, E. A. Davidson, spent the greater part of the summer in the park supervising the details of the landscape work in connection with road, trail, building, and other construction and improvements, and in the preparation of plans for future development. The influence of the landscape division is becoming quite noticeable in this park in the general improvement that has been done during the past few seasons. Excellently designed bridges and buildings that fit in with the National Park surroundings have been most favorably commented on by park visitors.

Sanitation.—H. B. Hommon, sanitary engineer of the United States Public Health Service, visited the park twice during the year and assisted with the designing and planning for sanitation development in Yakima Park, Paradise Valley and Longmire areas. Mr. Hommon also inspected all National Park Service and public-utility activities with reference to sanitation matters.

ELECTRICAL DEPARTMENT

Electric current is purchased from the Rainier National Park Co., which operates a hydroelectric plant, located on the Nisqually River 2 miles above Longmire. A total of 58,688 kilowatt hours of current were consumed in the lighting of residences, public buildings, and the public camp grounds, and in all electrical appliances including hot-water heaters in the public auto camps. The lighting system at Longmire was extended from the auto camp to the headquarters area and approximately 1,500 feet of light wires were installed in the public auto camp at Paradise.

Telephone system.—Two metallic and one ground circuit to Paradise Valley and the commercial circuit outside the park were maintained in addition to the 125 miles of single grounded wire encircling the mountain and connecting all of the ranger stations with the telephone switchboard at Longmire. Due to the poor type of construction, considerable difficulty was experienced in maintaining the telephone service sufficient to take care of the greatly increased business between Paradise Valley and the commercial lines. During the fire season it was necessary to send a special lineman and a small crew entirely around the park to repair and improve the grounded circuit which had become in such a bad condition that the service was unreliable.

All wires have been strung on trees and during severe winter conditions frequent interruptions of service are caused by the falling and swaying. Many breaks have also necessitated constant splicing and repairing, making it necessary to replace a great deal of wire.

PUBLIC UTILITIES

Hotel, pay camp, supply stores, curio shops, lunch counters, transportation, and other service operated by the Rainier National Park Co., were conducted in as satisfactory a manner as equipment and conditions permitted. Many favorable compliments on the quality of the food and the service were received, while on the other hand there was a great deal of criticism of the poor, cheap type of construction of Paradise Inn and the poor quality and run-down appearance of the equipment.

There were more complaints about the equipment in the Paradise and White River camps than during previous years. The tents, bedding, furniture, and other fixtures of these camps have been in use for several years and are greatly lacking in attractiveness as well as comfort. These conditions are due to the financial condition of the company and it is hoped that the situation can be remedied before another year. Unless there is a general overhaul of buildings and equipment and much improvement in quality of the fixtures and furnishings as well as the general appearance, unfavorable publicity will undoubtedly seriously injure the business of our park operators. Plans are under way for refinancing the company and it is hoped that a plan can be brought about so that the important improvements can be made before the beginning of another season.

One of the first improvements planned is the replacement of all the tents at Paradise camp with modern housekeeping cabins. This type of accommodation is greatly in demand and judging from inquiries of visitors who ask for cabin accommodations, tents no longer satisfy the average park visitor.

Proposal of the Rainier National Park Co. to construct an aerial tramway from the Glacier Bridge to a point on the rim of the Nisqually Glacier about 1 mile from Paradise Inn and the construction of a modern 250-room fireproof hotel has received consideration from the director, the landscape architect, and other officers of the National Park Service, as well as from other prominent persons interested in National Park development. No actual opposition to the proposed aerial tramway has developed, but all National Park Service officials and all those not connected with the company have expressed themselves as opposed to the location of the cableway in any manner that will interfere with the view of the Nisqually Canyon as one approaches the Glacier Bridge from either direction.

ROAD DEVELOPMENT

Exhaustion of the available cash for contract payments last fall forced some of the contractors to close down and others to curtail their construction activities before the end of the working season, thereby delaying the completion of the projects.

The failure of the State to provide for an approach road to connect with the north end of our West Side Highway has resulted in considerable delay on that important route. Due to lack of an approach road it is not practicable to start construction on the north end as it had been hoped in order to push the project to an early completion.

The following are the road projects which were under way on September 1, 1929:

Nisqually Road, 1-A, Paradise section; reconstruction, 8 miles; contractor, John Hampshire, of Grants Pass, Oreg. This project should be completed this fall.

West Side Highway, 2-A, Round Pass section; clearing, grading, and surfacing 9 miles; contractors, Joplin & Eldon, of Portland, Oreg.; should be completed this fall. Section 2-B, Klapatche Ridge section; grading, 4 miles; contractor, A. C. Greenwood, of Portland, Oreg.; will be completed this fall. Section 2-C-1, Klapatche Ridge-North Puyallup River; 3.1 miles, clearing contractor, A. C. Greenwood, of Portland, Oreg.; will be completed this fall. Section 2-E-1 West Boundary-Mowich Lake; clearing, 1.7 miles; contractor, Lucich Co., of Seattle, Wash.; will be completed this fall.

Yakima Park Highway, 3-A-1, East Boundary-White River Crossing; 4.12 miles, clearing and grading; contractor, Lidral Construction Co., of Seattle, Wash. This project will be completed this season. Section 3-A-2, East Boundary-State Highway Connection; clearing and grading, 1.35 miles; contractor, A. C. Goerig, of Seattle, Wash. This project will be completed this season. Section 3-B-1, White River-Yakima Park-Yakima Creek section; 2 miles, clearing and grading; contractor, A. C. Goerig. Project was completed December 15, 1928. Section 3-B-2, Yakima Creek-Sunrise Ridge section; clearing and grading, 4.2 miles; contractor, A. C. Goerig, of Seattle, Wash. This project will be completed this fall. Section 3-B-3, Sunrise Ridge-Shadow Lake section; clearing and grading, 3.32 miles. Bids called for, opening September 4. Contract to be let with requirement that project will be completed during the working season of 1930.

The White River Bridge was completed by the contractor, J. C. Tobin, and accepted on July 20, 1929. This bridge is a 60-foot concrete arch faced with granite and provided with stone railing and a 4-foot bridle path. The architectural design of this project has been highly complimented by engineers and park visitors alike. It is a most fitting structure for the national parks.

RECOMMENDATIONS AND CONCLUSION

The serious fire hazards which existed throughout the entire summer of 1929 again emphasized the need for a progressive policy of forest protection. Especially needed is an adequate lookout and patrol system so that the fires may be discovered promptly, ample modern fire equipment cached about the park to be readily available, and a trained personnel for handling crews and directing fire suppression.

The completion of the State highway leading to the northeast section of the park and of our new highway leading to the Yakima Park plateau during 1930

makes it imperative that a personnel and complete facilities be available by June 15, 1931, for serving the 75,000 visitors who will come to that newly opened area during July and August.

In conclusion, I wish to express my appreciation for the assistance and cooperation of the Washington office and various field divisions, for the loyalty and support of all of the employees of this park, and especially the good work of the ranger force in serving park visitors better than they were ever served before.

PLATT NATIONAL PARK

KING CRIPPEN, Superintendent, Sulphur, Okla.

SPRINGS

All of the mineral springs at Platt National Park, which includes the Bromide, Medicine, and Sodium Chloride in the western part of the park, and the Black Sulphur, Bromide Sulphur, and Hillside Spring in the central part of the park, are keeping up in volume. The Antelope and Buffalo Springs, in the extreme eastern part of the park, continue to flow, and there is no indication of their going dry at this time, although they are supposed to go dry periodically and then resume flowing again as though nothing had happened.

TRAVEL

Travel to Platt Park continued heavy during the year just ended. The following table shows the number of visitors and campers to the park for the past five years:

Visitors:		Campers:	
1925	143,380	1925	43,823
1926	124,284	1926	45,798
1927	243,370	1927	51,584
1928	226,324	1928	54,314
1929	204,598	1929	60,985

CAMP GROUNDS

Free public camp grounds are maintained during the entire year, one at Bromide, called the Bromide camp, in the western part of the park, one near the central part of the park, called Central camp, and one in the central eastern part of the park, called Cold Springs camp. At each of these camps fresh running water is piped to the different parts of the ground; electric lights and modern toilets or comfort stations are furnished and bathing facilities are available. Community buildings at Bromide camp and Cold Springs camp are provided. Further extension of the camp grounds should be made for the ever-increasing number of campers.

ROADS—TRAILS

The need for more and better roads will, it is hoped, be taken care of by future appropriations necessary to complete the park road system, which connects with State highways leading to park roads. The park road system is necessary to make its attractions available to the public and it also connects the State highways with various sections of the State. Platt has some 11 miles of roads and 3 of trails. The State helps maintain a part of the road system crossing the park.

IMPROVEMENTS

The principal improvements at Platt during the past year were made to the different springs. A number of the springs are in the creek or on its bank and were subject to pollution from the water of the creek. The Medicine Spring container was made higher and recemented, and the bed of the creek was lowered and a cement walk made with waterways under the walk to keep the creek water from the spring. An electric pump was installed to pump the water from the spring to container in the pavilion. The Sodium Chloride Spring, in the center of the creek, was repaired and water pipes relaid to the pavilion. The Hillside Spring was renovated and a ditch dug to carry away all surface water from the spring. The Black Sulphur Springs were the real

problem, as they were continually being overflowed with water from Rock Creek. These springs were opened up and a large drum was constructed and sunk around the springs to the proper depth. The spring was cemented in with cement and brought to an elevation where it is impossible for it to be polluted with creek water. The water was piped and carried to a suitable place from which it will be taken to the pavilion recently made.

A fine cement pavilion with fountain has just been completed for the Black Sulphur Springs. A new tool shed is under construction for the park and a number of minor improvements have been made during the past year.

ANIMALS

The park animals are a source of much pleasure to the people. There are 4 buffalo, 8 elk, and 9 deer.

ROCKY MOUNTAIN NATIONAL PARK

EDMUND B. ROGERS, Superintendent, Estes Park, Colo.

JURISDICTION

The outstanding event of the past year for Rocky Mountain National Park was the ceding of jurisdiction to the Federal Government, by the State of Colorado, over the area within the boundaries of the park. The act passed the State legislature on February 15, and jurisdiction was accepted by act of Congress approved by President Coolidge on March 2, 1929. While the park was created by act of Congress in 1915, the matter of ceding jurisdiction was neglected until two or three years ago, when the question came up in connection with transportation over the Fall River Road. Jurisdiction, however, has not been assumed, pending the appointment of a United States commissioner for the park by the Department of Justice.

ADMINISTRATION

On February 1, 1929, Supt. Roger W. Toll was transferred to Yellowstone National Park, and Edmund B. Rogers was appointed superintendent of Rocky Mountain National Park, effective February 2. Thomas J. Allen, jr., former assistant superintendent of this park, was transferred on November 2 to the superintendency of the Hawaii National Park. John C. Preston, former chief ranger, was promoted to the assistant superintendency of this park. The permanent staff consists of 11—superintendent, assistant superintendent, 4 rangers, 2 clerks, general foreman, auto mechanic, and storehouse keeper. The increased business of the park taxed the capacity of the office force during the summer season. The superintendent maintained headquarters in Denver during the winter, as has been the custom for a number of years, where direct contact may be had with the Bureau of Public Roads and other agencies closely associated with the national-park work.

Cash appropriations allotted to the park for the fiscal year 1928-29 were as follows:

Regular park appropriation-----	\$93, 500. 00
Donations:	
Mosquito control-----	273. 15
Bathhouse-----	1, 000. 00
Snow removal-----	3, 500. 00
	<hr/>
	4, 773. 15
Total roads and trails funds allotted to this park (including \$333,000 unappropriated) from the establishment of the road budget to June 30, 1929-----	637, 858. 75

REVENUES

Public utility operators-----	1, 311. 70
Timber sales-----	69. 75
Miscellaneous permits-----	4, 761. 16

OUTSIDE ASSIGNMENTS

Superintendent Toll spent the month of October in the Washington office on personnel classification work. He also visited the proposed Shenandoah and Great Smoky Mountains National Parks.

TRAVEL

Tourist travel into Rocky Mountain National Park shows an increase of 20 per cent over last year's figures. All gateways report increased motor travel, but the most noticeable gain has been counted at the Bear Lake entrance, where an increase of 72.3 per cent over last year's figure is shown. This is due to the completion of the new primary road from the park boundary to Bear Lake, which makes it possible for the motorist to drive to the high, rugged country over a standard 18-foot, graveled road on which the maximum grade is 7 per cent.

Rangers were on duty at four gateways from June 15 to September 15, inclusive. The travel count was taken for a period of nine hours per day. The following tabulation shows the actual count, and the total estimated travel:

	Total travel	
	Cars	Persons
Actual count at 4 gateways:		
June 15 to 30, inclusive, 1929	5,276	17,721
July, 1929	14,213	51,557
August, 1929	17,765	64,977
Sept. 1 to 15, inclusive, 1929	4,163	13,905
Total actual count	41,417	148,160
Estimated:		
Missed by rangers at entrances during same period, 30 per cent	12,425	44,448
Travel at other entrances during same period	4,800	48,000
Travel during months when no count is kept—		
October, 1928	650	2,600
November, 1928	300	1,000
December, 1928	200	800
January, 1929	150	500
February, 1929	250	1,000
March, 1929	500	2,000
April, 1929	650	2,500
May, 1929	1,550	6,000
June 1 to 14, inclusive, 1929	1,550	6,000
Sept. 16 to 30, inclusive, 1929	3,240	11,400
Total estimated travel	67,682	274,408

Actual count by type of travel

	Total travel	
	Cars	Persons
Private cars:		
General	33,397	118,565
Camping	3,060	10,353
Repeaters	2,342	4,896
Rocky Mountain Parks Transportation Co. cars	1,493	9,510
Hotel cars	184	489
Rent cars	53	257
Trucks	840	1,743
Motor cycles	48	63
Horseback		2,014
Pedestrians		270
Total	41,417	148,160

Actual count by automobile entrance

	Total travel	
	Cars	Persons
Fall River Road, at Horseshoe Park.....	15, 761	58, 716
Highdrive, at Deer Ridge.....	4, 797	19, 029
Bear Lake Road, near Glacier Basin camp ground.....	10, 074	37, 216
Grand Lake.....	10, 785	33, 199
Total.....	41, 417	148, 160

The Fall River Road, which is the principal scenic road of the park and one of the highest roads of the country, crosses the Continental Divide and connects Estes Park with Grand Lake. About 32 miles of this road are within the park. The best method of approximating through travel over this road is to take the sum of the inbound and outbound travel past the Grand Lake entrance. The travel count at this entrance is as follows:

	Total travel	
	Cars	Persons
Grand Lake entrance, inbound travel.....	10, 785	33, 199
Grand Lake entrance, outbound travel.....	12, 719	39, 319
Total.....	23, 504	72, 518

INFORMATION SERVICE

Fifteen hundred people have been served at the information office at the administration building during the 1929 season. Approximately 15,000 free Government publications—maps and information pamphlets—have been distributed by this office. Four hundred and ninety-one Government publications, totaling in value \$99.50, and 131 private publications, totaling in value \$39.10, were sold through this office during the year.

ROAD CONSTRUCTION

Surfacing of the newly reconstructed Bear Lake Road, begun under contract last season, was completed and accepted July 23, 1929. A contract for the oiling of this highway was let late in the season. Parking spaces at the Glacier Gorge junction and at Bear Lake were constructed under force account.

Bids for the contract on the construction of the 17.2-mile standard highway along Trail Ridge from Deer Ridge to Fall River Pass were advertised for September 4, 1929. Clearing and a small amount of grading are expected to be completed before the winter shut-down. The new road will take the travel which now traverses the eastern side of the Fall River Road, the grades and curves of which are such that it can not accommodate the heavy travel. The Trail Ridge Road will also have more scenic qualities, in that it follows the crest of the ridge while the present road follows the valley.

TRAIL CONSTRUCTION AND MAINTENANCE

The construction of standard trails, which was begun last year, was resumed this season. Construction during the season on the North Longs Peak Trail was carried 7,000 feet; Lawn Lake Trail, 20,000 feet; Thunder Lake Trail, 6,000 feet; North Inlet Trail, 3,600 feet; and Storm Pass Trail, 1,300 feet, making a total of approximately 7 miles of standard new trail. A nature trail was constructed around Bear Lake, and it is believed this trail will prove very popular with those interested in nature study.

Assistant Engineer A. van V. Dunn, of the National Park Service field headquarters, was assigned to this park during the 1929 season, to supervise trail

construction and make a study of the trail needs of the park. This park does not have a resident engineer, and Mr. Dunn's assistance is very much appreciated.

There are 175 miles of trail maintained throughout the park.

BUILDINGS

A new cottage for employees was built at the utility site in the fall of 1928. We now have five cottages at the utility site. These have been named for trees common in the park—Pine, Spruce, Cedar, Juniper, and Aspen.

A mess hall and stable were constructed on the Bear Lake Road.

During the spring of 1929 a checking station was constructed on the Bear Lake Road, and a stable is nearing completion on the west side of the Fall River Road.

A bathhouse was built on the Glacier Basin camp ground. One thousand dollars of the cost of this building was donated by the Highlander Boy Foundation, an organization with headquarters in Denver, which sends annually from 600 to 800 boys into the park for their summer encampment.

A concrete frost-proof cellar, with sleeping quarters above, was constructed at the superintendent's residence.

Toilet buildings were erected in the following locations: Two at the top of Fall River Pass, four in Glacier Basin camp ground, and two in Longs Peak camp ground.

WATER SUPPLY AND SANITATION

A complete water system was installed on the Glacier Basin camp ground during the 1929 season and four public toilets installed. Seven thousand feet of 3-inch pipe was laid from Boulder Brook to the camp ground and Bear Lake checking station, and 1,000 feet was laid to the new Bear Lake Road camp.

Sanitary Engineer H. B. Hommon, of the United States Bureau of Public Health Service, spent a short time in the park at the time this work was begun, and it was finished under the supervision of Mr. Dunn.

The water lines at the utility site, which froze up very badly last winter, were buried 4 feet to prevent future freezing and an electric pump was installed in an insulated room in the machine shop to replace the gravity system heretofore used.

PROTECTION

On October 22 the permanent ranger force of three rangers was increased by the appointment of an additional ranger. During the winter a patrol was established for the protection of animals and park property. This is the first year that regular patrol work has been done in this park during the winter months, as the force previously was too small. The position of chief ranger has been vacant since the promotion of John C. Preston to the position of assistant superintendent on March 21, 1929.

During the summer 15 temporary rangers were employed for checking of visitors, patrol of roads and trails, care of camp grounds, enforcement of regulations, fire lookout, and general protection.

ANIMALS

Park animals are in good condition and seem to be increasing in numbers. Elk have been seen in herds numbering 50 to 75 animals and signs of this animal have been noted in the northeastern part of the park, where they have been seldom seen previous to this year. Deer frequently came down into the village of Estes Park during last winter. There has been a decided increase in the number of bears reported seen by visitors. After the lapse of many years, timber wolves have been reported in this region, there being four cases in widely separated localities inside of two weeks. The timber wolf is a highly objectionable animal, which was thought to have become entirely extinct in this section of Colorado.

The estimated number in the park, of black tail deer is 3,500; mountain sheep, 450; elk, 300; and bear, 45.

FIRES

The extremely dry weather the early part of the summer created a serious fire hazard. Practically all of the fires of the year occurred during the last two weeks of June. During that period there were four fires in the park,

and, in addition, park men assisted in fighting one fire on private lands and two on Forest Service lands. The only fire of the year which did any considerable damage was the one which started on the western slope of Twin Sisters Mountain on the afternoon of Sunday, June 23. This fire burned over approximately 60 acres of lodgepole pine before it was under control the following morning. About 200 men were employed on this fire and the cost to the Government for hire of men, purchase of supplies, loss of tools and equipment was in the neighborhood of \$1,000.

ACCIDENTS

There was only one fatal accident in the park during the year. On August 18 Charles W. Thiemeyer, of Denver, while attempting to climb the precipitous east face of Longs Peak, in company with Dr. and Mrs. Arthur Starcher, of Boulder, lost his hold and fell to the bottom of the precipice, many hundreds of feet below. His two companions tried to complete the climb but were forced by darkness and the presence of ice to spend the night exposed to freezing weather on the side of the cliff. They were rescued the next day by rangers.

The ascent of Longs Peak continues to be one of the most popular climbs in the park. The shelter cabin on the Boulder field has proven a boon to climbers who wish to make the climb in installments. More than 1,600 persons registered in the book kept on top of the peak for that purpose.

The first ascent of the peak was made by three students from the Colorado Agricultural College, who ascended the peak on December 31, and returned safely on January 3. Extremely stormy weather necessitated their spending three nights at the shelter cabin on the Boulder field. These winter excursions and the dangerous climb up the east face of Longs Peak are not encouraged by the National Park Service.

WINTER SPORTS

The annual winter outing of the Colorado Mountain Club was held at Fern Lodge February 16 to 24, about 50 members of the club attending the outing. Snow conditions were excellent.

EDUCATION

Educational activities were in charge of the ranger-naturalist, who delivered lectures all during the season at the various hotels and other public places in the park and vicinity, and conducted field trips the following morning from the same location. During the summer the naturalist delivered 50 lectures, attended by 5,520 persons, and conducted 37 trips, with a total attendance of 1,286. Approximately 1,000 persons visited the small museum collection on exhibition in the administration building. It will thus be seen that approximately 8,000 persons took advantage of the educational facilities offered by this park. This is about double the number recorded last year. Seven universities and colleges conducted field courses in this region during the summer, and in September 200 members of the Kansas Geologic Association were piloted through the park by the naturalist on the last lap of their 2-weeks' field conference.

Nature News Notes were prepared by the naturalist twice a month and given to people interested.

SNOW REMOVAL

Snow removal work on the Fall River Road began on April 24 and continued until June 15, when the road was officially opened for travel. As usual, this work was done by a steam shovel on the eastern side of Fall River Pass and by men and teams on the western side. This year a steam shovel operated in one shift with crews working overtime instead of in two shifts as was done last year. There was more snow on the western slope this spring than usual and hand shoveling was necessary, beginning at Grand Lake. Approximately 100,000 cubic yards of snow were removed. This is a larger volume of snow than usual, the increase being principally on the western side. A large proportion of the expense of this work was borne by donation from the Rocky Mountain Parks Transportation Co. The annual snow removal work continues to be one of our most serious problems.

WEATHER

Beautiful autumn weather prevailed until Thanksgiving Day, when the first heavy snow of the season occurred. During December, January, and February the park shivered and froze through one of the coldest, if not the very coldest, winters that this region has ever known. The eastern slope had its full share of wind and the western slope had more than its share of snow. Spring arrived late. June was very dry, July very wet, and August warm and dry. On the whole, the summer season was very pleasant and weather conditions most favorable for travel.

ROAD MAINTENANCE AND IMPROVEMENT

The heavy rains during July were very hard on the roads, both inside of the park and those approaching the park, although no serious wash-outs occurred and the roads were kept passable.

On June 9 the bank of Copeland Lake, which was of glacial formation, gave way due to overloading and washed out about 150 feet of roadway just below the lake. This lake is outside the park and was used as water supply for the town of Longmont. The town of Longmont repaired the road, which is one of the approaches to the park, but the lake, which was a popular mirror for the high peaks, was destroyed.

About 700 feet of roadway on the Fall River Road, at the beginning of the long ascent above Endovalley camp ground, was widened so as to make two-way travel possible. This stretch of road had been dangerously narrow heretofore.

The park maintains 60 miles of high, mountain roads, reaching a maximum elevation of 11,797 feet.

TELEPHONE LINES

The Bear Lake ranger station telephone line was reconstructed on a new location out of sight of the road, from Sprague's Hotel to the ranger station.

The Government owns and maintains 61 miles of telephone line and 133 stations.

SIGNS

Four thousand thin-metal boundary signs, reading "National Park Boundary Line—Hunting Prohibited," were placed along the park boundary at intervals of approximately 100 yards.

Forty trail and road signs were placed along trails and roads during the season.

EQUIPMENT

A 1½-ton G. M. C. truck and an Indian motor cycle with side car have been added to park equipment from regular park funds. Two Rix air compressors, two rock drills, and some tents and other small equipment were purchased from roads and trails funds for use in trail construction. A typewriter, filing case, and mimeograph machine were purchased for office use.

MOSQUITO CONTROL

Mosquito-control work was carried on in the vicinity of Grand Lake under the direction of Ranger McLaren, and the residents of that district express their satisfaction with the work and their desire to have operations continued from year to year. Control was more difficult than usual on account of the wet spell in July. Inasmuch as some of the area treated is outside the boundaries of the national park, the local residents contribute funds toward this work equal to the amount provided by the Government.

CAMPING

The Government maintains five free public camp grounds, all of which are equipped with running water and toilet facilities. There are two camp grounds on the Fall River Road—Aspen Glen at the boundary of the park, 4 miles from Estes Park village, and Endovalley at the head of Horseshoe Park; Pinetide camp ground is on the Utility Group tract, Longs Peak at the base of the Longs Peak Trail and Glacier Basin on the Bear Lake Road.

FISH HATCHERY

The Estes Park fish hatchery was completely rebuilt and enlarged during the year and is now one of the most up-to-date hatcheries in the country. This hatchery is outside of the park boundary, but is a chief source of supply for fish for park streams and lakes. The hatchery has a capacity of 3,000,000 fish and is several times larger than the old building which it replaced.

SEQUOIA NATIONAL PARK

JOHN R. WHITE, Superintendent, Sequoia National Park, Calif.

RETROSPECT

As I begin my tenth annual report on the Sequoia National Park it is perhaps natural that I should reflect on the progress made during the more than nine years I have been superintendent.

In July, 1920, when I relieved Judge Walter Fry, my chief inheritance was the fine spirit of conservation and public good will which he had built up. There was no park headquarters and practically no park equipment. The only development was a few acres at Giant Forest which was accessible for three or four months in summer by a narrow, steep wagon road. Travel to the park was not accurately registered, but on a basis of automobile permits issued, it was about 16,000 visitors in 1919. The park was just emerging from the horse-and-buggy days of Army control.

The conditions may best be indicated by the fact that the only quarters available for the incoming superintendent, his wife, and baby, were two rooms in the storehouse, which the family shared with tools, mice, and flies.

My first winter office, many miles outside the park at Kaweah, was above a chicken house. A cat kitted in the box which served as a waste-paper basket. Such tools and equipment as the park possessed were scattered amid many ranches in the Three Rivers and Kaweah districts.

The administrative division, which started in July, 1920, with the superintendent and an office cat kitting in the waste-paper box, has now grown to an efficient organization under Assistant Superintendent Tobin, with a total of six permanent employees and additional summer storehouse and telephone assistance. Mr. Tobin and Miss Frances Pierce have been eight and six years, respectively, in Sequoia, and are so thoroughly familiar with park routine that the superintendent is relieved from practically all details. Mrs. W. B. Lewis is a highly efficient stenographer, who handles all secretarial work, and Mr. Frank Smith has rapidly become proficient in all purchasing and voucher work. I feel safe in saying that the administrative office functions with as little official and personal friction as in any national park.

Today, over nine years later, the park is more than doubled in area and is accessible in mid-winter as in mid-summer by a fine oiled or paved highway. The "chicken-house" office has been replaced by a fairly complete park headquarters at Ash Mountain, with a total of 45 administrative buildings and quarters. In place of the 3 permanent employees there are now 30. Travel accurately recorded at several entrances exceeds 100,000 visitors annually, who are accommodated in a score of public camp grounds which, if yet incomplete, offer sanitary and other conveniences undreamed of several years ago.

The park has emerged from the horse and buggy stage into the full tide of the automobile age, and the wings of the airplane are heralding a further development of park transportation. This upbuilding of the past nine years has taken place during the era of post-war economy so that, despite the almost tenfold increase of travel, the 352 square miles addition, and the multiplication of needs in every direction, the appropriations for administration, protection, and maintenance have only increased from \$35,000 in 1920 to \$96,000 in 1929.

THE PAST YEAR

The chief event of the past year affecting the park has, of course, been the resignation of Director Stephen T. Mather on account of illness. While all parks had a share and profit in the generous vision of Mr. Mather, yet the Sequoia National Park benefited in a special manner because of the personal interest he took in the purchase of private holdings. Throughout the park, and for all time, many groves of Big Trees and flowering meadows will bear

witness to the vision and to the personal generosity of Stephen T. Mather. And the present superintendent with many successors will have cause to be grateful that vexatious problems of private ownership at strategic scenic points have been removed.

TRAVEL

The park showed a healthy increase in travel despite the continued financial depression in the San Joaquin Valley. A gain of 13.6 per cent is shown, with a total of 33,252 cars and 111,385 visitors, of which 10,716 cars and 37,607 visitors entered the park during the off-season months, October to May.

ALL-YEAR TRAVEL

The Generals' Highway to Giant Forest was kept open for the first time throughout the year, and this was possible only by the extra exertions of the park maintenance crew under General Foreman Parkes, who was tireless in his work on snow removal and road repairs.

WINTER SPORTS

Winter sports were indulged in from December to the end of March and thousands of visitors enjoyed the toboggan slide, skiing, and snowshoeing. A skating rink is needed, with construction of permanent toboggan slide. Further improvements of winter accommodations are promised by General Manager Mauger, of the Sequoia & General Grant National Parks Co. The hard surfacing of the highway is a necessity to insure safe and comfortable travel.

ROAD CONSTRUCTION

Road construction during the year was limited to the completion of the existing contract by the bonding company. By next season we shall have use of 2 miles of new highway to Lodgepole camp. This will bring to the front the long-visualized problem of the development of that popular public camp beside the Marble Fork and at the entrance to the miniature Yosemite of Tokopah Valley. Two miles of new highway beyond Lodgepole camp can not be used fully until the Marble Fork, Silliman, and Clover Creek bridges are built, although limited use will be had by fording the creeks. The new entrance section of the Generals' Highway below Ash Mountain was finished by day labor and opened for travel on August 1.

TRAIL CONSTRUCTION

Trail construction progressed rapidly under the appropriation of \$40,500, a total of 15 miles being built on high standards. It is hoped to complete the Atwell-Hockett Trail so as to permit use of that section of our main north and south trail, although some additional work may be needed at the Hockett end next year. The High Sierra Trail was constructed from Crescent Meadow to Panther Creek, and all crews then centered at Seven Mile Hill Trail camp in an effort to construct sections A and B for early travel. The Mount Whitney section was constructed to within 2,000 yards of the summit of Whitney, and completion will render the highest point in the United States, outside of Alaska, accessible for horse travel practically for the first time.

FIRE PREVENTION

Under Chief Ranger Cook, with advice from Fire Control Expert Coffman, additional progress was made on fire prevention. Three lookouts were maintained, 16 fire-tool caches were available, 2 patrolmen were at stations, and protection was so good that no serious fire occurred. A total of 8 fires reported in the park were promptly extinguished, while 66 fires were reported to forest and State officers outside the park. No greater need exists than the rapid extension of our road and trail system so as to permit ready access to every area of great fire hazard. Despite ranger and lookout efficiency, complete control of the fire risk in these magnificent forests can not be assured until the lower forest and higher brush areas are opened up.

NATURE GUIDE SERVICE

Dr. Ralph Chaney, of the Carnegie Institute, delivered a series of lectures on the Sequoias, and we were honored with a visit from Dr. John C. Merriam.

GREATEST NEEDS

The urgent needs of the park are additional fire protection, a community building and museum at Giant Forest, hard surfacing of main roads, and extinction of the remaining private holdings which have been reduced from 2,680 acres in 1920 to 1,811 in 1929. A handicap to development in the past has been the lack of a large-scale map of the Giant Forest area; but work on this map is now proceeding and when completed will make possible intelligent planning and recording of all developments.

FIELD HEADQUARTERS ASSISTANCE

Relations with offices and personnel of field headquarters at San Francisco have been harmonious, and we are indebted for constant advice and assistance from Chief Engineer Kittredge, Chief Landscape Architect Vint, Chief Naturalist Hall, and their assistants. Sanitary Engineer Hommon continued his fine cooperation, and a sewer system at Ash Mountain headquarters was completed under his supervision.

PUBLIC OPERATORS

The public operators continued to render satisfactory service, and complaints were few. Reorganization of the Sequoia & General Grant National Parks Co. took place, and Mr. George L. Mauger, the new general manager, showed a fine spirit of working with the park forces. He has taken particular interest in the back country, hitherto somewhat neglected by the public operators. The development of the saddle and pack-train business particularly engages his attention.

It is hoped that with the construction of the Eddy studio at the new village, the long-delayed clean-up of the old village may progress.

Rail and stage travel has been lighter than ever, owing to the almost perpetual disagreement between the Askin Co. and the park operators. Only 687 stage passengers were carried as compared with 511 last year and 428 in 1920 over the old road to Indian Lake.

VISITS OF DIRECTOR

Director Horace M. Albright visited the park twice, in May and August, and all in the Sequoia join the undersigned in wishing him a long and successful administration of the national parks.

THE YEAR'S CHIEF ACCOMPLISHMENTS

The major accomplishments of the past year are tabulated below. The Sequoia National Park has had a successful 1928-29 season, and we look forward to continued success and further development under the administration of Director Albright.

[illegible]

New construction by National Park Service:		Cost
Permanent stucco 4-room cottage, with bath-----		\$2, 420
New 2-room ranger station, frame, at Colony Mill, replacing one destroyed by fire-----		1, 275
Complete sewer system installed at Ash Mountain with 50,000-gallon concrete water-storage tank-----		13, 600
Machine shop frame, with concrete floor at Ash Mountain-----		3, 990
Incinerator, of concrete, with water-supply line-----		1, 610
Steel center span installed on Marble Fork Bridge, replacing defective wooden span-----		4, 200
Water line, approximately 1,200 feet, installed at Trauger fireguard station.		
Corral and pack base at Lodgepole camp for Government and public use.		
2 comfort stations at Trail Center, Giant Forest.		
12 miles of tree-strung telephone line in Clough cave district, replacing line destroyed by forest fire.		
New trail, $\frac{1}{3}$ mile, built to Clough cave, replacing bridge entrance destroyed by forest fire.		
Parking areas enlarged at Bear Hill, Sherman Tree, and the new village.		
Additional spray line installed at Giant Forest sewer-disposal tank.		
Second section constructed in stone stairway up Moro Rock.		
2 additional rooms added to 2 small quarters at Ash Mountain-----		1, 100
New entrance gate erected at South Fork trail entrance.		
6 miles new trail on High Sierra project.		
6 miles new trail on Atwell-Hockett.		
2 $\frac{1}{2}$ miles new trail on Oriole Hospital.		
2 miles new trail on Mount Whitney.		
Road oiling: 25 miles road oiled-----		7, 000
Fire prevention:		
3 lookout stations operated.		
2 fireguards on duty in hazardous areas.		
2-ton fire truck purchased and equipped.		
Blankets for 100-man fire crew purchased.		
Mess outfit for 70-man fire crew purchased.		
10 miles emergency telephone line purchased.		
2 miles fire trail built on Paradise project.		
Fire-equipment stock room built at Ash Mountain.		
4 miles telephone line to fire lookouts at Paradise and Cahoon rocks.		
Public operators:		
General store constructed in new village by Sequoia & General Grant National Parks Co.		
5 housekeeping cabins added at Camp Kaweah.		
Studio of Lindley Eddy at new village under construction.		
Major equipment acquired:		
1 snow plow at cost of \$800.		
2 Ford $\frac{1}{4}$ -ton pick-up trucks, at \$575 each.		
1 1-ton dump truck, cost \$2,000.		
1 5-ton Federal truck, transferred from Prohibition Service.		
1 60-horsepower tractor, with hoist, cost \$7,100.		
1 road maintainer, cost \$840.		
1 trail compressor, cost \$1,125.		
1 Hudson sedan, cost \$1,200.		

STATISTICS

	1929		1928	
	Cars	Visitors	Cars	Visitors
Travel:				
By private auto.....	33, 252	107, 508	29, 290	93, 627
By stage.....		406		511
By other means.....		3, 471		3, 897
Total.....	33, 252	111, 385	29, 290	98, 035
Travel by entrances:				
Ash Mountain station.....	30, 063	98, 447	25, 998	84, 162
Mineral King Road.....	3, 189	9, 467	3, 292	9, 976
Trail entrances.....		3, 471		3, 897
Total.....	33, 252	111, 385	29, 290	98, 035

Origin of travel (Ash Mountain entrance)	1929	1928	1927	1926
	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
San Joaquin Valley.....	63. 7	64. 0	62. 7	64. 6
Southern California.....	22. 8	24. 2	28. 1	27. 8
Northern California.....	5. 6	4. 2	4. 1	3. 6
Other States and foreign.....	7. 9	7. 6	5. 1	4. 6

	1929	1928
Number of visitors using camp grounds.....	21, 266	19, 956
Number of public camp grounds.....	15	15
Name and number of camp sites in each:		
Sunset camp.....	20	
Sunset Rock camp.....	25	
Paradise camp.....	35	
Firwood camp.....	45	
Pinewood camp.....	25	
Bridge camp.....	24	
Soldier camp.....	10	
Old Commissary camp.....	20	
Sherman Tree camp.....	20	
Lodgepole camp.....	75	
Hospital Rock camp.....	25	
Potwisha camp.....	25	
Knob Hill camp.....	20	
Hazelwood camp.....	35	
Atwell Mill camp.....	25	
Total.....	429	
Roads, number of miles.....	40½	40½
Telephone lines, number of miles.....	128	125
Trails, number of miles.....	597	582

Wild life	Condition	Number
Bear, California black.....	Very good.....	25
Deer, California mule.....	do.....	6, 00
Fisher.....	do.....	50
Marten.....	do.....	1, 00
Mink.....	do.....	20
Foxes.....	do.....	35
Gray squirrels.....	do.....	20
Bobcats.....	Good.....	15
Coyotes.....	Very good.....	1, 00
Mountain lions.....	do.....	4
Wolverine.....	do.....	
Mountain beaver.....	do.....	3, 00
Grouse.....	do.....	8, 50
Quail.....	do.....	
California condors.....	do.....	1
Golden eagles.....	do.....	
Bald eagles.....	do.....	
Green herons.....	do.....	20
Wild pigeons.....	do.....	1
Horned owls.....	do.....	

	1929	1928
Revenues:		
All sources, fiscal year.....	\$31,178.51	\$37,121.02
Auto licenses, travel year.....	\$18,399.00	\$16,399.00
Appropriations:		
General.....	\$95,040.00	\$87,820.00
New construction.....	\$17,000.00	\$19,000.00
Roads and trails.....	\$50,000.00	\$274,800.00
Court cases before United States commissioner:		
Total cases.....	9	9
Convictions.....	9	7
Total fines imposed.....	\$295.00	\$190.00
Grazing:		
Number of cattle.....	1,300	1,150
Number of permittees.....	8	8
Areas occupied, acres.....	47,480	60,000
Fish planted.....	150,000	125,000
Library books circulated.....	3,125	3,655
Fires:		
Total number inside park.....	8.0	12
Acres burned.....	1.1	926
Number of fires reported outside park.....	66.0	-----

Month (Public operators, Sequoia & General Grant National Parks Co.)	Number of arrivals			
	1929		1928	
	House-keeping	Lodge	House-keeping	Lodge
May.....	179	350	200	296
June.....	901	1,111	716	861
July.....	1,190	1,237	1,320	1,134
August.....	1,278	1,234	1,263	831
September.....	633	549	556	750
Total.....	4,181	4,481	4,055	3,872
Stage passengers, 1 way.....	687		511	
Giant Forest winter camp.....	489		----	

SULLYS HILL NATIONAL PARK

JOHN S. R. HAMMITT, Acting Superintendent, Fort Totten, N. Dak.

While Sunday and holiday visitors to Sullys Hill National Park came in about the same numbers as a year ago, more visitors were recorded on week days than any other year. This is believed to be due mainly to the improvement of the road between the park entrance and the main highway. Visitors for the year numbered 21,004, coming in 4,936 private cars. The gate is open to visitors all summer and at other times when the weather is favorable.

Some work was done during the season with funds provided by the Biological Survey. This included road work in the picnic grounds and the installation of some shelter and sanitary facilities, as well as smaller improvements. Wesley D. Parker, warden in charge of the game preserve, took an exceptional interest in park work and cooperated in an exceptionally fine manner.

ANIMALS

The animals are in good condition. There are now 13 buffalo (2 of them this year's calves), 31 elk (including 8 calves), 9 mature antelope and 7 fawns, 1 buck white-tail deer, 17 Canada geese, and many ducks.

A fence about 170 rods long and parallel with the picnic grounds fence but from 15 to 20 rods back has been constructed with 2 division fences, thus making 3 exhibit pastures. The largest of these pens contains the buffalo, the next one an elk or two, and the other some antelope. Park visitors seem to derive much pleasure from watching these animals.

WIND CAVE NATIONAL PARK

ANTON J. SNYDER, Superintendent, Hot Springs, S. Dak.

GENERAL STATEMENT

Wind Cave National Park was created by act of Congress dated January 9, 1903, and with subsequent additions now embraces 10,899.22 acres. Its topography is peculiar to that of the lower elevations of the Black Hills of South Dakota in which it is located, and its climate is a happy medium between that of the plains and the mountains. In a general way the park might be said to be arid—that is, it has no rivers, lakes, or big streams, therefore, no fishing. The main feature of the park is a large limestone cavern of great beauty, the enchanting atmosphere of which attracts thousands of visitors every year.

ADMINISTRATION

The superintendent is the representative of the National Park Service in immediate charge of the park. His duties embrace all phases of development, protection and operation under the general policies and regulations of the Interior Department and the Park Service. No clerical assistance is provided the superintendent, nor does the park have an engineering organization to plan or direct construction or maintenance projects. The ranger personnel consists of 1 permanent ranger and 13 temporary rangers employed during the summer months to direct traffic and guide visitors through the cave. The permanent ranger acts as a general assistant to the superintendent in all work and operation and has charge of the park during the superintendent's absence.

TIME OF CAVE TRIPS

Beginning October 1 and continuing until April 30, only one trip a day, at 2 p. m., is made in the cave. On May 1 a trip at 9 a. m. is added, and on July 1, for the months of July and August only, trips at 10.15 a. m., 3.15 p. m., and 7 p. m. are scheduled, in addition to the 9 a. m. and the 2 p. m. trips. A choice of the routes is not given on these additional trips, for, due to the lack of time, the Garden of Eden, or short route, only can be taken. Each party entering the cave must be accompanied by park rangers or authorized Government guides. The fee for this guide service is 50 cents per person. Children under 5 years of age are admitted free, but they must be accompanied by parent or guardian.

THE GAME PRESERVE

The game preserve maintained in this park by the Bureau of Biological Survey, Department of Agriculture, and administered by a reservation protector in their employ, consists of two pastures, one constructed in 1912 embracing 3,400 acres, and another, completed early this spring, containing 3,600 acres. The animals in the preserve now number approximately 175 buffalo, 95 elk, and 25 antelope. All save about 90 head of the choice buffalo are confined in the old or west pasture. During the past winter about 100 tons of hay were fed to the game animals. This was the first winter since the preserve was established that the animals had to be fed. The feeding last winter was occasioned by an overstocked pasture and the consequent depletion of natural forage.

APPROPRIATIONS AND REVENUES

The park's net appropriation of \$10,700 for the 1929 fiscal year was increased \$760 by a deficiency allotment to take care of salary increases under the Welch Act, and \$100 by release of the unallotted reserve. The total revenues for the 1929 fiscal year were \$14,035.01, or \$2,475.01 more than the appropriation for that year. A total of \$13,617 was derived from cave entrance fees \$318.01 from grazing cattle, and \$100 from concessions. The total revenues represent a net gain of 24 per cent over the revenues for the 1928 fiscal year. This makes the second successive year that the park's revenues have been greater than the regular annual appropriation, and with every favorable prospect for the caves increasing popularity and little assurance of larger appropriations there is good indication that Wind Cave will continue to be a source

of material profit to the Government. It might be parenthetically added that the park does not receive enough for efficient administration or operation and that with the exception of the \$54,000 allotted this year for reconstruction and surfacing of the park road there has been no item of development or improvement since 1925, when \$1,500 was appropriated for the construction of a small ranger cabin.

GENERAL OPERATIONS

The past year has been characterized by unusually heavy travel, made a severe burden to us by the lack of every facility and accommodation. We have been short of water, we have no camp ground, the cave is inadequately lighted, and no accommodations are provided for the seasonal personnel which this year numbered 13. Every endeavor has been concentrated upon the conducting of visitors through the cave and in maintaining grounds, buildings, etc., in as presentable a condition as possible. There have been a good many complaints against the poor service which we are necessarily enforced to render, but on the other hand the more broadminded and considerate visitors have extended us a generous measure of sympathy and have voiced their appreciation of the trip in the cave.

WEATHER

The weather this summer was, with the exception of about 10 days of extremely high temperatures, mild and pleasant, and ideally suited to motor touring. The park experienced the abnormal cold spell that was felt nearly everywhere in the United States and Europe during February of the past winter. In general the winter here was an open one with snowfall somewhat below normal.

VISITORS

Again Wind Cave has shown an increase in the number of visitors. July and August, the heaviest months, registered 10,419 and 12,544 paid cave entrances, respectively. August established a record that has never before been even approximated, the previous high mark for that month being 10,906 last year. The biggest day's attendance was on July 6 on which there were 610 paid entrances to the cave. The total number of visitors to the cave this season was 29,265, or an increase of 8.1 per cent over the 27,049 for 1928.

IMPROVEMENTS

Bids were let for the reconstruction and surfacing of 4.27 miles of the park highway and contract awarded to the T. J. Tobin Construction Co., of Madison, S. Dak., the low bidders. The project is being handled by the Bureau of Public Roads, and it is expected to be completed by November 1, 1929. No other construction projects were programmed by the National Park Service this year. The dam being built by the United States Biological Survey for an artificial lake on Cold Spring Creek near the game-preserve headquarters is practically completed. When finished the dam will provide a connection between the park road and approach roads from the north.

RECOMMENDATIONS

The growing popularity of Wind Cave, and the enthusiastic indorsement given the cavern by the majority of visitors, places the park in purpose and spirit fully within the intent of its status as a national park. The small appropriations and the absence of practically every development to meet the need of this ever-increasing attendance are making it humanly impossible to maintain the dignity of the Federal Government. An up-to-date sewage-disposal system should be provided at park headquarters; more water should be made available either by procuring an additional supply or by proper extension and improvement of the present water-supply system; a new stone administration building to take the place of the present unsightly frame building should be constructed; the cave should be wired and lighted by electricity; ample, clean, and comfortable quarters should be provided for park employees; and the grounds and buildings at headquarters should be placed and kept in a more respectable condition; a modern tourist camp should be provided and maintained either by the game preserve at the scenic lake or at the cave by the Park Service; and there should be a deliberately calculated and well-coordinated program covering operation and development for both the game preserve and the park.

YELLOWSTONE NATIONAL PARK

ROGER W. TOLL, Superintendent Yellowstone National Park, Wyo.

GENERAL

This year in Yellowstone National Park was characterized by numerous changes in the personnel. Horace M. Albright, who served as superintendent beginning June 28, 1919, was promoted to the directorship of the National Park Service, effective January 12, 1929, relieving Hon. Stephen T. Mather, who resigned because of illness. Mr. Albright served in the capacity of superintendent of the Yellowstone longer than any former occupant of the position.

Roger W. Toll, superintendent of Rocky Mountain National Park, became superintendent of the Yellowstone, effective February 1, 1929. During the winter months Assistant Superintendent M. F. Daum was acting superintendent, and for the period from January 12, 1929, to March 19, 1929, when Mr. Daum was assigned to special accounting work in Washington, D. C., Assistant to the Superintendent Joseph Joffe was acting.

Sam T. Woodring, who served as chief ranger of the Yellowstone organization since 1922, was promoted to the superintendency of the new Grand Teton National Park, effective May 15, and George F. Baggley became chief ranger of the Yellowstone, effective June 22.

The fall season was very mild, and it was possible to get to the Upper Geyser Basin by car until about the middle of December. However, after the real winter weather set in it was very severe, and there was very little warm weather during the spring. Most of the roads were rather slow to open. The north and west gates were open to travel on June 1, and from the start there was a continued increase in travel over previous years. When the travel season closed our records indicated an increase of 29,713 visitors over last year, or 11 per cent.

The formal opening of the park took place at Gallatin Gateway, Mont., the Chicago, Milwaukee, St. Paul & Pacific Railroad's entrance to the Yellowstone. The address of welcome was made by the superintendent of the Yellowstone and Hon. Horace M. Albright, Director of the National Park Service, H. A. Scandritt, president of the Milwaukee Railroad, and Maj. Evan Kelly, district forester, gave short talks. Movie men representing Pathé, Metro-Goldwyn, Paramount, International, and the Fox Movietone were in attendance. About 50 Indians from the Flathead Reservation in Montana, as well as the Terry (Mont.) Cowboy Band, participated.

Road conditions in the park were very good during the summer and the newly oiled stretches held up particularly well under the extremely heavy traffic. With the large amount of rainy and cool weather early in the season, the park was particularly beautiful, but after about the middle of July the continued warm weather dried up the country and presented an entirely different appearance. The flowers were particularly beautiful during the early part of the season. The fire hazard was very serious late in the season, due to the continued warm weather and little rainfall.

The wild animals of the park were seen at numerous places during the entire park season and the bears were more in evidence than in any previous years. Fishing was excellent and afforded a great deal of amusement to the thousands of park visitors.

The continued extension of the educational work met with favor on every hand, and park visitors received a great deal of benefit from the facilities available and the service extended. The new museum at Old Faithful was opened when the first park visitors arrived and proved to be one of the main points of interest in the park. A new trail-side museum and ranger station was constructed at Madison Junction during the summer and will be available for park visitors next year, as will also a trail-side museum near the Norris Geyser Basin. Several members of the President's Commission on the Educational Work in the National Parks visited the Yellowstone during the summer, including Dr. H. C. Bumpus, Dr. Frank R. Oastler, Dr. William John Cooper, and Dr. W. W. Atwood.

The new geyser which broke out in the Lower Geyser Basin last year continued to play during the summer and was one of the main features of the park. This geyser was named by members of the National Editorial Association party while at Old Faithful on July 31. The name "Imperial" was selected for the geyser.

The new Director of the National Park Service spent a great deal of the summer in the park, familiarizing the new superintendent with his duties and aiding in the carrying on of the work here.

The park this summer has been visited by a large number of prominent persons. The two outstanding groups which visited the park were the National Editorial Association party and the Yellowstone Park Boundary Commission. The National Editorial Association party included newspaper men from all parts of the country. Prior to their entry into the Yellowstone they aided in the dedication of the new Grand Teton National Park, which was created on February 26, 1929, when President Coolidge signed the bill. While in the Yellowstone this party selected the name for the new geyser which broke out during the summer of 1928. The name "Imperial" was selected. The Boundary Commission held hearings at Cody, Wyo., and Ashton, Idaho, and covered the southeast corner, the southwest corner, and the country southeast of the park on horseback. This commission was made up of Dr. E. E. Brownell, of San Francisco; Dr. T. Gilbert Pearson, of New York City; Dr. Arthur E. Morgan, of Antioch College, Ohio; Mr. C. H. Ramsdell, of Minneapolis; and Arthur Ringland of Washington, D. C. Director Albright, Superintendent Toll, Assistant Forester L. E. Kneipp, and R. H. Rutledge, the latter two of the United States Forest Service, and Ovid M. Butler, editor of American Forests and Forest Life, of Washington, D. C., accompanied the party on the pack trip through the southeast section.

The park was also visited by a party of European journalists representing leading newspapers. While this party was in the park, one of its members, Mr. Georges Landoy, of Antwerp, Belgium, fell into a hot pool in the Upper Geyser Basin, receiving serious burns which later resulted in his death.

Members of the Wyoming Game and Fish Commission and members of the commissions from Idaho and Montana held meetings in the park, as did also the Wyoming Peace Officers and Colorado Sheriffs and Peace Officers Association and the State boards of engineering examiners.

WEATHER

Temperatures were near normal for the last four months of the year 1928. January, February, and May of 1929 were below normal, and a slight negative departure occurred for June. Temperatures were practically normal during March, April, July, and August. The lowest readings of the winter occurred on February 7, when the minima ranged from -27° at Mammoth to -50° at Riverside. The maxima so far this summer were 89° at Mammoth on July 25 and 94° at Riverside on July 31.

Precipitation was deficient in all months except October and July, with decided negative departures during December and May, although the latter month had twice the average amount of snow. Snow depths were somewhat below normal throughout the park until late in the winter, although some heavy falls occurred.

TRAVEL

Park visitors this year totaled 260,697, as compared with 230,984 last year, an increase of 29,713. The rail travel figures were 38,979, as compared with 41,697 last year, a decrease of 2,718. A comparison of rail figures of this season and last year is as follows:

Gateway	1928	1929	Gain	Loss
North.....	13,021	12,243	-----	778
West.....	121,001	19,213	-----	1,788
East.....	7,567	7,233	-----	334
South.....	108	290	182	-----
Total.....	41,697	38,979	182	2,900

¹ Rail travel accredited to the west entrance during the tourist season of 1929 consisted of 14,012 persons via the Oregon Short Line Railway (Union Pacific System), 3,159 via the Chicago, Milwaukee & St. Paul and Pacific (Gallatin Gateway terminal of the Milwaukee), and 294 persons from the Bozeman terminal of the Northern Pacific.

Automobile visitors by entrance gateways as compared with last year are as follows (this travel is exclusive of motor cycle and preseason auto visitors) :

Gateway	1928	1929	Gain	Loss
North.....	39,887	39,198	-----	689
West.....	67,495	76,897	9,402	-----
East.....	58,128	73,732	15,604	-----
South.....	18,055	24,758	6,703	-----
Total.....	183,565	214,585	31,709	689

The number of cars and visitors reported at developed public camp grounds during the season of 1929 are as follows :

Designated developed camp grounds	Cars	Camper
Old Faithful.....	22,763	71,931
Mammoth.....	13,998	44,233
Lake.....	17,780	56,184
Canyon.....	13,771	43,516
West Thumb.....	3,520	11,123
Norris Junction.....	974	3,077
Madison Junction.....	1,664	5,258
Tower Falls.....	2,287	7,226
Total.....	76,757	242,552
Approximate number of cars and campers using undeveloped camp sites.....	3,698	11,685

Total season travel by entrance gateways, 1929 and 1928

Gateway	Rail visitors	By automobile		By motor cycle		Miscel- laneous (walking, horse- back, etc.)	Preseason visitors	Total visitors
		Cars	Visitors	Cars	Visitors			
1929								
North-----	12, 243	13, 881	39, 198	40	50	484	3, 726	55, 701
West-----	19, 213	23, 696	76, 897	40	44	271	603	97, 028
East-----	7, 233	23, 061	73, 732	78	96	244	-----	81, 308
South-----	290	7, 777	24, 758	23	28	1, 479	108	26, 668
Total-----	38, 979	68, 415	214, 585	181	218	2, 478	4, 437	260, 697
1928								
North-----	13, 021	13, 581	39, 887	43	48	277	2, 508	55, 741
West-----	21, 001	20, 536	67, 495	51	68	284	556	89, 404
East-----	7, 567	18, 258	58, 128	54	66	274	-----	66, 035
South-----	108	5, 653	18, 055	10	14	1, 591	36	19, 804
Total-----	41, 697	58, 028	183, 565	158	196	2, 426	3, 100	230, 984

Many new travel records were established this season. The opening of the Grand Teton National Park has encouraged more traffic by way of the south entrance. More cars had checked in at the south entrance by August 16 this season than were recorded at that gate for the entire season of last year.

ADMINISTRATION

Headquarters office.—On January 12, 1929, Superintendent Horace M. Albright was promoted to the position of Director of the National Park Service, and on February 1, 1929, Roger W. Toll, superintendent of Rocky Mountain National Park, was promoted to the position of superintendent of Yellowstone National Park.

The regular personnel now consists of Roger W. Toll, superintendent; Merrill F. Daum, assistant superintendent; Joseph Joffe, assistant to the superin-

tendent; Leroy Hill, disbursing clerk; Andrew R. Edwin, senior clerk and bookkeeper; Margaret M. Jamieson, files and personnel clerk; Mary Waring, clerk-stenographer; and Esther Martin, timekeeper. This force is augmented during the summer season by two clerk-stenographers and one assistant cost clerk. The maximum number of employees upon the pay roll at one time was approximately 500. Our labor turnover amounted to less than 20 per cent.

Appropriations.—Appropriations made available since the date of the last report are as follows:

Roads and trails, national parks.....	\$343,789.08
Donations, National Park Service.....	20,907.81
National Park Service, 1929-30 ¹	453,000.00

Revenues for 1929.—Funds collected during the fiscal year 1929 and deposited to the credit of miscellaneous receipts in the United States Treasury were as follows:

Franchise and permit fees.....	\$112,223.25
Automobile and motor-cycle permit fees.....	172,523.00
Electric current.....	5,775.93
Water rent.....	602.88
Miscellaneous.....	13,820.11
Total.....	304,945.17

ENGINEERING DEPARTMENT

This department is in charge of Resident Engineer Cecil A. Lord and Assistant Resident Engineer Lloyd C. Regnell. The duties consist of road maintenance, including dust prevention and snow removal, road reconstruction, and improvement and surfacing.

Road maintenance.—The park road system consists of 302 miles of road designated as follows: Grand Loop, 142 miles; approach and connecting roads, 79.6 miles; roads to points of interest, 83.4 miles. In addition, the park force maintained 28 miles of the East Entrance Road in the Shoshone National Forest and 32 miles of the South Entrance Road in the Teton National Forest. Much new maintenance and equipment was placed in use this year, and at the end of the season there were in service 2 heavy tractors, 1 light tractor, 10 motor patrol graders, 14 small dump trucks, 2 light trucks, and 26 teams and wagons.

Dust prevention.—Light oiling for dust prevention was started June 7. Approximately 170 miles were oiled to varying widths with two to three applications of heavy 60-70 per cent road oil at the rate of one-sixth gallon per square yard. The number of applications as well as the rate of application varied to some extent with the volume of traffic, the type of road surface, and weather conditions.

A new type of road maintenance was found necessary over that used in the past. This consisted of lightly scarifying the oil mat and processing by blading it back and forth across the road to obtain a uniform mixture, which was then spread out on the surface and compacted by traffic. The uniformity of the resulting surface is better able to withstand traffic than the mat formed after applying the oil.

Snow removal.—Weather conditions were unfavorable for the normal melting of snow. The work of opening the roads was started April 22 with the blasting of snow in Golden Gate. The road along the west side of the park was opened to traffic May 17 and the road to the east side May 28. Other roads were opened to traffic as follows: Old Faithful to Thumb, June 6; south entrance to the east entrance and through Dunraven Pass, June 18; across Mount Washburn, July 1. Unusually cold weather in May and June retarded this work considerably and also was the cause of much subgrade difficulty between Lake and Canyon, where the late melting snows kept the ground in a saturated condition until the latter part of July.

Roadside clean-up.—Prior to this year, 45 miles of roadside clean-up had been done with donated funds and 24 miles with our Government construction funds. This year a system of maintaining this clean-up along with our regular

¹ \$8,000 reserved for Washington office expenditures and \$4,530 as an unallotted reserve. \$970 also transferred to field headquarters.

road-maintenance work was inaugurated. Accordingly, 69 miles of roadside clean-up have been maintained.

Road construction.—Road construction and road reconstruction were carried on as outlined below:

Project 1-A, Mammoth-Norris Junction.—The reconstruction of the first 3 miles of this project north of Norris Junction was completed this spring and surfaced with 6 inches of obsidian sand. Unusual difficulties were encountered during this reconstruction in excavating through the "hot formation" where the material was too hot to blast or for continuous handwork. There will be no additional work upon this project this fall.

Project 1-B, Norris Junction-Madison Junction.—The contract for the reconstruction of 5 miles of the Gibbon Canyon Road between Gibbon Meadows and the old Mesa Road junction was completed last fall at an approximate cost of \$107,712. This contract did not provide for the surfacing of the new road nor for the rebuilding of the two steel bridges that span the Gibbon River.

Project 5-B, east entrance-Sylvan Pass.—The 4 miles of road reconstruction under contract will be completed this fall. An additional contract for the remaining 6 miles between the east entrance and Sylvan Lake was let this summer and is under construction at the present time. Due to the difficult nature of the work and the topography of the country, it will be at least another year before this new section will be in use by traffic. This last contract provides for surfacing of the East Entrance Road from Lake Butte to the east entrance, a distance of 15 miles, which includes the surfacing of the Cub Creek section completed last fall.

Project 5-C, Cub Creek section of East Entrance Road.—This project was completed last November and has been in use all season. The contract was let for the surfacing of this project this year.

Project 6-A, West Gallatin Road.—This project was completed last fall.

Project 6-B, Grayling Creek section of the West Gallatin Road.—This work will complete the reconstruction of the road along the West Gallatin River through the northwest corner of the park. The road is being reconstructed with park forces and with equipment consisting of a 1-yard Osgood gas shovel, three or more heavy dump trucks, one heavy tractor and grader, and miscellaneous drilling equipment. This work will be completed in September and will cost approximately \$70,000. No provision has been made for surfacing.

Lake Shore Road processing.—Twelve miles of this road were partially processed last year. Cold weather and lack of equipment prevented the completion of the job. The first 5 miles of the road were treated with from 18,000 to 20,000 gallons of oil per mile. The last 7 miles were treated with approximately 24,000 gallons per mile. Under the hot sun that has prevailed this summer it was found that the mix was too rich and considerable remixing was necessary to get a smooth surface.

BUILDING MAINTENANCE AND CONSTRUCTION

Maintenance.—Considerable improvements have been made in the main storehouse in the rearrangement of the stores and the construction of additional bins. A cork concrete-lined cold-storage room was constructed and equipped with a ½-ton ammonia refrigeration plant. Separate receiving and shipping rooms were arranged. The storehouse office space was practically doubled. The old blacksmith shop was ceiled and remodeled into an auto shop. This included the installation of necessary heating units. The blacksmith shop was removed to the space formerly occupied by the Army horseshoer, which was remodeled to take care of this activity. The usual minor building maintenance was carried on throughout the park. The exterior of the storehouse was painted this season the usual stone-gray color. An old storehouse building was remodeled into duplex apartments this year. This building was originally constructed in 1891 as a granary.

New construction.—One snowshoe cabin was constructed in conjunction with the new museum at Madison Junction. A bunkhouse and messhouse were completed at Norris Junction, as were bunkhouses at Lewis River and at Madison Junction. These are the standard type 10-men buildings. A duplex 1½-story ranger station was completed this spring at the south entrance. A 3-lane checking station was constructed at the east entrance. A standard messhouse was constructed at Tower Junction. The museum at Old Faithful was completed this spring and opened to the public June 20.

LANDSCAPE ENGINEERING

The architectural, landscape, and planning problems of the park were handled by Thos. C. Vint, chief landscape architect, and K. C. McCarter, jr., landscape architect, who was in residence in Yellowstone Park during the building and construction periods. Mr. Vint made four visits to the park during the year on general inspection trips. Considerable work was done on the Mammoth Hot Springs area general plan. Plans were drawn in the headquarters office for the Park Service buildings listed elsewhere in this report and all utility operators' buildings constructed were approved, located, and supervised by the landscape division.

Roadside clean-up.—Roadside clean-up was carried on this year both with donation and Government funds. The roadside clean-up between Canyon and West Thumb was completed last fall, and work was started on a new project between West Yellowstone and Old Faithful, of which 7 miles have been completed and approximately 7 more miles are now under way. Roadside clean-up has been started upon the Norris-Madison Junction road-reconstruction contract work, and the Cub Creek road-reconstruction contract and is being carried on as part of our regular reconstruction work on the West Gallatin project.

Approximately 69 miles of roadside have been cleaned up to date, 45 miles of which has been done with donation funds. This work has included not only the removal of the logs and debris of that nature along the road, but also of obsolete structures such as sprinkling tanks, pipe lines, etc. All but 50 of the 350 sprinkling tanks have been removed during the past three years.

SANITATION DEPARTMENT

This work is carried on under the supervision of H. B. Hommon of the United States Public Health Service and under the direct charge of William W. Wiggins. Mr. Hommon made a thorough inspection of our entire operations in July and outlined necessary corrective measures. He also worked up a definite program for our water and sewer system and sewage-disposal construction work. Mr. Wiggins makes weekly sanitary inspections as outlined by Mr. Hommon.

Auto-camp extension and improvement.—We have concentrated this year on the extension of the Fishing Bridge, Thumb, and Old Faithful auto camps. The work consisted of building fireplaces, tables, and bear-proof garbage stands. No great increase in area was made to any auto camp, but additional camp sites were provided in the present area and wider roads were necessary to care for the increased travel. This is particularly true of the Thumb auto camp, where a new entrance has been constructed, and of the Old Faithful auto camp where the main roads have been widened from 20 to 40 feet in order to accommodate the traffic that is attracted to the bear feeding grounds. No comfort stations were constructed this year.

Extension of the water system.—This work this year consisted in extensions in the Old Faithful-Thumb auto camp to provide new camp sites and the construction of small systems for the Cooke City Ranger Station, the Lewis River Road camp, the Norris Museum, and the Canyon incinerator.

Sewer extension and improvement.—Except for minor extensions, all the work was concentrated upon the construction of a new concrete sedimentation tank and concrete-covered filtration tank, which is to provide for the Fishing Bridge auto camp. Additional facilities were provided at Thumb auto camp which has outgrown the system constructed in 1926. All auto camps with the growth of the housekeeping units have overtaxed the existing facilities to a great extent during the past season. Our sewage-disposal system consists of the operation of six septic tanks with chlorine sterilization apparatus and four sedimentation tanks.

Garbage incinerator at Canyon.—A new 4-ton incinerator similar to that constructed at the Lake is being built at Canyon this year to care for all the garbage from the Canyon area. This structure is being located half a mile west of the Chittenden Bridge.

Mosquito control.—This year mosquito control consisted of the spraying of 700 gallons of oil upon swamps and pools adjacent to our various auto camps and extensive ditching.

ELECTRICAL DEPARTMENT

This department is in charge of Chief Electrician Charles D. Dale, who has three permanent power-plant operators and one permanent telephone operator.

During the past winter two turbines from the hydroelectric plant at Mammoth have been reconditioned, causing an increased plant efficiency and using 25 per cent less water this year than last year, with the result that our water-supply lines have not been overloaded and have been able to carry the load all season without interruption. Our peak load this year has decreased considerably from last year on account of the installation by the Yellowstone Park Hotel Co. of a 93-kilowatt steam generator.

	1927-28	1928-29
Total production in kilowatt-hours-----	736, 550. 0	706, 650
Sold to park operators-----	98, 519. 5	96, 291
Line loss and used by the Government in residences or for power and street lighting-----	638, 030. 5	682, 370

Telephone system.—This year's heavy telephone maintenance consisted of the reconstruction of 15 miles of line in Slough Creek, using native poles and metallic circuit; the addition of metallic circuit between Mammoth and Norris, a distance of 20 miles; the replacement with cedar poles and metallic circuit of 8 miles of the line between Lake and Thumb; and the repoling of the 22 miles of line between Mammoth and West Gallatin Ranger Station. We maintain 528 miles of circuit and a total of 159 telephones. The switchboard now located in the ranger station at Lake will be moved to new quarters in the mess house being constructed this fall, where rooms have been provided for the telephone office and quarters for the operators.

PROPERTY

On June 20 Purchasing Clerk Russell Sprinkel was transferred to Yosemite National Park as chief clerk, and the storehouse was reorganized with Oscar B. Eggen as storekeeper placed in charge of all operations, the position of record clerk being made a six months' temporary position. Thomas Hickman, record clerk, on August 22 was promoted to the position of purchasing clerk. One temporary clerk-stenographer and two permanent laborers assist in the operation of this department.

During the past year approximately \$175,000 of materials and supplies have been issued to various departments of this organization and cooperative bureaus, and approximately \$26,000 worth of equipment, as compared with \$20,000 last year, has been purchased for the use of the various departments.

MECHANICAL DEPARTMENT

This department is in charge of Master Mechanic Robert R. Robinson, who has 6 permanent mechanics, 1 permanent blacksmith, 2 temporary mechanics, and 2 temporary blacksmiths under him. Our equipment list consists of two 5-passenger sedans, one 7-passenger touring car, one coupe, 6 motor cycles, 11 tractor units, two power shovels, one compressor, miscellaneous small tools, and camping equipment for 300 men. This equipment is overhauled each year and placed in condition for efficient operation the coming season. Although the operating season is short, yet in order to guarantee continuous operation the overhauling work has to be more intensive in order to detect the partially worn-out units that would not last a full season. This department operates a fleet of 15 freight trucks and 10 oil trucks.

PROTECTION DEPARTMENT

Personnel consists of 1 chief ranger, 4 assistant chief rangers, 26 permanent park rangers, and 43 temporary park rangers (employed for the tourist season; period of service approximately 90 days).

Winter activities.—The fall, winter, and spring season activities were mainly regular, and special patrols for the observation and protection of wild-animal life; the observation of weather conditions; reading and reporting water-gage heights, snow depths, etc.; hunting predatory animals; repair and maintenance of telephone lines, buildings, and other equipment; wild-animal feeding at the hay ranches; the care and feeding of the Park Service horse herd at their winter feed grounds.

Summer season activities.—The ranger organization has been kept busy during the tourist season checking entrance and exit travel, regulating traffic, dispensing information, conducting parties, delivering lectures, compiling reports, maintaining and repairing trails, snowshoe cabins, ranger stations, and other improvement, and making patrols for control of forest fires, and other regular and special patrols for the protection of the natural features of the park.

Forest fires.—Precipitation for June and July was slightly below normal. The season for fire hazards began slightly earlier than last year. Precipitation during August was very light. Temperatures were a little above normal. Numerous roadside fires have been reported and extinguished. A few small fires in the interior of the park have been suppressed before they gained headway. The total number of fires to date is 13; the total expense for the year is \$336.64. Prompt action in all cases has reduced the loss from fire to a minimum.

Trail construction, maintenance, and improvements.—New trail construction consisted of one-half mile at the Imperial Geyser, one-fourth mile near Osprey Falls, 12 miles between Snake River ranger station and West Thumb ranger station. A new guard rail was constructed at West Thumb around the paint pots, new platforms and steps near Tower Falls, new guard rails around the Mud Volcano, 200 feet of guard rail near the Imperial Geyser, and 100 feet of guard rail in Black Sand Basin. Trail maintenance work has been carried on extensively at Mammoth, Canyon, Lake, and Old Faithful. All patrol trails and main pack trails have been cleaned and repaired. The total trail mileage within the park is approximately 902 miles, including trails of all classes. Total money spent on trail work for the year was \$2,669.

Fish planting.—Fish planting has been carried on under the supervision of the Bureau of Fisheries. The work is tabulated in the comparative table given below.

	1927	1928	1929
Total collection of black spotted trout eggs from park waters.....	13, 313, 000	23, 684, 000	14, 655, 000
Number of eggs collected in park, hatched, and returned to park waters or planted as eyed eggs.....	5, 113, 000	8, 347, 000	7, 152, 000
Total fish shipped to outside points.....			27, 000
Total eggs shipped to outside points.....	5, 983, 000	10, 614, 000	6, 852, 200
Total.....	11, 096, 000	18, 961, 000	14, 031, 200
Total number of fish planted in park waters:			
Black spotted trout collected in park.....	5, 113, 000	8, 347, 000	7, 152, 000
Brook trout received from Bozeman, Mont., hatchery.....	37, 750	13, 000	31, 600
Loch Leven trout received from Bozeman, Mont., hatchery.....		71, 500	84, 000
Rainbow trout received from Bozeman, Mont., hatchery.....	52, 500	98, 000	37, 300
Rainbow trout received from Saratoga, Wyo., hatchery.....	16, 000		
Total fish plants for year.....	5, 219, 000	8, 530, 300	7, 304, 900

Loss on eggs and fry this season, 623,800.

BUFFALO RANCH ACTIVITIES

The work at the buffalo ranch during the year has consisted mainly of care and keep of the herd, and the harvesting of 500 tons of hay as compared with 945 tons last year. There is a total of 1,100 tons of hay available for feeding during the coming winter. New construction is as follows: 1 new log bunk house, size 72 by 24, 95 per cent complete; 700 feet of pole fencing consisting of fifty 14-foot panels; new chutes and squeezes; and some new hay corral work. No live buffaloes were shipped during the past year. One hundred head of steers were slaughtered during the month of December, and sold for market purposes. One outlaw bull was destroyed, 2 buffaloes died from accidents, 1 was winter killed, and 2 cripples were destroyed.

HAY RANCH OPERATIONS

Wild animal and horse feeding at the Slough Creek, Yancey, and Gardiner ranches accounted for 302 tons of hay. There is a balance of 167 tons of hay now on hand. With the 1929 crop and the carry-over there is now on hand 1,212 tons of hay. Other ranch operations have been repair and maintenance of equipment and buildings.

PREDATORY ANIMALS

Two hundred and eighty-eight coyotes were killed during the past year, as compared with 284 a year ago, and 238 in 1927.

NATURAL FEATURES OF THE PARK

Forest and plant life, thermal activities and wild life conditions have been observed and reported by the park rangers throughout the year. A brief summary of their observations is given as follows: Generally, conditions have been somewhat better than the previous year.

Buffalo-Lamar River herd.—The herd total on May 31, exclusive of the 1929 calf crop was 947, divided as follows: 432 adult males, 378 females, 137 calves. The latest count of the 1929 calf crop taken on September 21 was 145.

Buffalo-Cold Creek, Pelican Creek wild herd.—No special reports are available for this herd, although 17 head were reported on Cache Creek in March, and a number have wintered each year near Turbid Lake, and in Pelican Creek near the warm springs. The general condition of all wild animals observed was good. There seems to be a gradual intermingling of the wild and tame herd. It has reached a point where it is difficult to distinguish the buffalo of the wild herd from those of the Lamar River herd.

Mountain sheep.—The largest count obtained during the year was 77 as compared with 170 last year. Winterkills and other losses accounted for seven. During the past winter the sheep did not bunch as much as they have in previous winters. Bands wintered on Mount Everts, Junction Butte, and Mount Norris. During the summer tourists have observed a band on Mount Washburn, and a few have been reported near the Cooke City road, between Soda Butte and Cooke City. Although mountain sheep in the park are not quite as numerous as a year ago, those remaining seem to be in good condition.

Antelope.—A count secured in March, 1929, shows 510 animals, and winter losses of all kinds accounted for 24. The antelope were on their spring range April 19. They were observed near the buffalo ranch on April 26. The antelope are frequently reported on the game preservation ranch, on the Gardiner Ranch, and are observed nearly every day in the Tower Falls district. The latest estimate secured on September 21 was 638. All animals observed during September were in excellent condition. A discussion took place during the Wyoming Game Commission meeting about antelope, and reports state they are increasing.

Moose.—Estimates secured during the winter of 1928 and 1929 give the number of moose in the park as 675. The largest number observed was in the Upper Yellowstone district, where 97 were counted on one patrol. No winter losses have been reported. The moose are very well distributed over the park. Spring and summer appearances have been reported from Slough Creek, Tower Falls, Soda Butte, Canyon, Upper Yellowstone, Cub Creek, Bechler River, and numerous other parts of the park. Comparative counts and estimates show the moose to be increasing, and all moose observed seem to be in good condition.

Deer.—Counts during the winter of 1928 and 1929 show 538 mule deer. The largest band observed during the year was 221 head observed in early May on the game preservation ranch. Report of winter losses, 33. A few were killed during the winter by hunters, but the figures are not available. Deer have been observed throughout the entire tourist season along the roadsides and at a great many places in the park. While the count of 538 was taken during the winter, it is estimated that there are a thousand or more deer in Yellowstone Park. Forage conditions for the deer during the summer have been excellent. No losses have been reported during the past summer.

Elk.—The elk have been the subject of a great many discussions. Special elk investigations have been carried on within the park by Wm. Rush, of the United States Forest Service, who has spent most of his time since February 15 on elk study. Dr. O. J. Murie, of the Bureau of Biological Survey, has been conducting extensive investigations in the Jackson Hole region. During the month of July, at a triangular game commission meeting held in Mammoth Hot Springs, Doctor Murie and Mr. Rush gave accounts of their investigations to the commissioners, and many good points relative to better management of the elk herds were brought out.

The annual elk count secured in Yellowstone National Park during April gives the total number in the park, including the Gallatin herd, as 13,309, as compared with 14,150 last year. The count was secured with the cooperation of the Forest Service and the game officials of Montana. At the time the count was taken the elk were still on their winter range in the Lamar River country, Slough Creek, Hellroaring, Blacktail and Gallatin districts. The loss during the year from disease and other causes was 48 animals. A total of 161 was reported killed by hunters during the 1928 hunting season. The elk did not migrate from the park on the north side, which accounts for the relatively small kill by hunters. Winter range conditions for the elk were very good—much better than the previous winter. The snowfall was somewhat lighter and did not crust as heavily as usual. Consequently the elk were in far better condition when spring came than has been the case for a number of years.

The summer forage conditions have been excellent. Elk started their migratory movement to summer range in early May, and they have been reported by rangers on patrol in all the higher parts of the park. Tourists have been able to see elk along the roadside in Hayden Valley, Elk Park, and Gibbon Meadows, and along the road from Mammoth to Mount Washburn. Elk feeding was started at Slough Creek on January 12 at the lower ranch; 150 to 400 animals were fed each day until March 18, when feeding was discontinued; 120 tons of hay were fed. Approximately 100 tons of hay are still on hand at Lower Slough Creek. Feeding was started at the Upper Slough Creek ranch on January 16 and discontinued on March 25. Ninety-seven tons of hay were fed at the upper ranch. Approximately 167 tons of hay remain for use this coming winter. No authentic reports are available on the Jackson Hole herd. The annual carry-over of hay from all ranches, and the 1929 crop from the Slough Creek ranches insures an ample supply to take care of the elk for the coming winter, unless an unusually hard winter forces them to leave the park.

Bears, black and brown.—The last available counts on black and brown bears give the number as 350. Later counts show a total of 440. Bears have been frequenting the camp grounds and bear feeding grounds at all points throughout the park. Large numbers are reported from Old Faithful, Canyon, Lake, Thumb, and Mammoth. The bear population of Yellowstone seems to have reached a point where they are somewhat of a nuisance.

Bears, grizzly.—The grizzly bears of Yellowstone have increased until the total counts and estimates show 150 to be in the park. Numerous grizzly mothers with three cubs have been observed. No doubt the excellent condition of the bears is accounted for by the abundant food supply in the way of garbage and scraps from public auto camps. During the past summer two major injuries are credited to the grizzly bear, one at Old Faithful and one at Canyon. Both injured parties recovered, however. It is proposed to ship a few live grizzlies to zoos or museums to reduce the number of grizzly bears to a point where they will not be a nuisance.

Beaver.—Throughout the park beaver have entirely cleaned out a great many aspen groves and small willow parks. No doubt beaver are increasing very rapidly. This little animal has furnished a lot of amusement for the tourists. Their food supply is running short at some points. However, as the supply is exhausted at one point they will migrate to another place and start their construction work. The beaver dams are a very valuable aid to fish culture in the park, as they provide natural rearing ponds for young fish.

Waterfowl.—Ducks, geese, and other birds were observed in large numbers throughout the past summer and fall. The pelicans on Yellowstone Lake show an increase of about 50 birds. A count taken during July shows 76 old birds and nearly 100 young on Pelican Island in Yellowstone Lake. Swan have been observed on the Yellowstone River and other places. Various species of ducks have been seen on all waters of the park. The National Park Service is cooperating with the Bureau of Biological Survey in securing a monthly waterfowl census.

Trees and insects.—No serious outbreaks of forest insects have occurred during the past year. The usual amount of infestation of Oregon engraver beetle was present. The trees in several areas which were attacked were cut and burned. Of these areas Roaring Mountain was the largest. Other attacks occurred along the Norris Road, at West Thumb and Old Faithful auto camp. During July the Mammoth auto camp was sprayed twice for aphid and the trees are in much better condition at the present time. The Bechler River region is heavily infested with spruce budworm attacking lodgepole pine. The

Bureau of Entomology has conducted test dusting and spraying in that area and it is hoped that they will perfect some method of control at this point. The sawfly and needletyer have almost ceased activity in the vicinity of West Yellowstone and the attack will probably die down entirely. During August the park naturalist in company with the chief ranger attended a class of instruction conducted by the Bureau of Entomology at Wisdom, Mont., for the purpose of obtaining information on the mountain pine beetle. It is hoped that no attacks of this insect are present in Yellowstone Park but at the present time an intensive survey of the west side of the park is under way for the purpose of discovering whether or not it has entered the boundaries.

GEYSERS AND HOT SPRINGS

Mammoth Hot Springs.—Monthly observations of the hot springs during the winter months showed very little fluctuation. One exception is to be noted in Minerva Terrace. Activity in this spring, which almost ceased in the fall of 1928, increased greatly and was one of the most beautiful sights at Mammoth during the winter. Stalactites and stalagmites were formed and the exquisite colorings of the grotto were the cause of many visits by the residents of Mammoth. The activity was so great at one time that a roar was plainly audible a hundred feet from the terrace. During the spring of 1929 a general increase in activity was noted in most of the springs at Mammoth. Blue Springs, Orange Spring Mound, Jupiter, Hymen, and Narrow Gauge Terraces were all extremely active. The activity of several of these springs made it necessary to reconstruct several portions of trail as the hot water made it impossible to travel over the old route. Activity in Narrow Gauge Terrace which began during the spring and has been maintained until the present time is especially interesting. Due to the rapid deposition and the extreme activity of this terrace the outlets have become smaller and smaller until the water no longer flows quietly down the sides but is thrown out in beautiful streams, sometimes rising to a height of several feet. Several new springs have broken out just west of Jupiter Terrace and Blue Springs. One large spring has broken out just above Devils Thumb.

Norris Geyser Basin.—The usual variation in activity characterized this basin during the past months. Considerable shifting of activity has been noted, especially during the month of August. Congress Pool drained during the fall of 1928 and became a huge steam vent. During the following spring it filled again and became the same bubbling cauldron as before. During July, 1929, however, it again drained and at the present time it is one of the largest steam vents in the basin. Constant Geyser ceased to play in August but in all probability this is only a temporary condition.

Lower Geyser Basin.—No considerable change in activity has been recorded for this basin during the past few months. The new geyser which broke out last year and which now bears the name Imperial has continued to play, thrilling thousands with its beauty and power. It plays on an average of twice every 24 hours for a period of $1\frac{1}{2}$ to 2 hours. A good trail has been constructed from the end of the road to the geyser and many tourists visit this geyser daily. The boiling level of the Fountain Paintpot has dropped about 12 inches during the past few months but still continues to bubble actively and is a source of much interest to the tourists. The lowering of the water level may be due to the extreme humidity of the atmosphere which we have experienced during the past few months. Great Fountain Geyser has been playing regularly every 8 to 10 hours, although the Fountain Geyser has not been observed in eruption this summer.

Upper Geyser Basin.—This, the greatest of all geyser basins, has witnessed an increase in activity during recent months. The Beehive Geyser erupted during the early part of June, but few tourists were present to witness this eruption. Giantess underwent a period of activity during the first part of the season, but since that time no eruption has occurred. An increase in activity of Giant Geyser was noted during the first part of the season when it erupted several times. This activity has continued on a minor scale throughout the summer. On July 3 the guide parties were fortunate enough to witness four major geysers of the Upper Basin—Castle, Giant, Giantess, and Old Faithful—playing at one time. Grand Geyser, in the opinion of many the most beautiful geyser in the park, continues to play with no sign of diminishing power. Daisy Geyser in the Black Sand Basin seems to be increasing slightly in power and it is usually witnessed in eruption by members of the guide parties during the morning.

EDUCATIONAL DEPARTMENT

The educational staff during the winter consisted of a park naturalist and two part-time rangers. During the summer it consisted of the park naturalist, head ranger naturalist, 16 ranger naturalists, and 1 park ranger. In addition to this three park rangers have cooperated in giving lectures and conducting guide trips.

The outstanding event in the educational department for the year was the opening of the museum of thermal activity at Old Faithful as the result of a portion of the fund from the Laura Spelman Rockefeller Memorial. The building consists of an information office, exhibit room, open court, and a study room for ranger naturalists. Although primarily a museum of thermal activity, other exhibits, such as historical, botanical, and zoological, are to be seen. The open court is devoted to evening lectures and each night is filled to capacity. The Old Faithful museum became at once popular with the tourists and 95,080 persons visited the building during the 1929 season. The museum at Mammoth opened on June 1, and has continued to attract crowds throughout the summer. The attendance for the tourist season was 59,507 against 68,487 for the season of 1928. The publications sold at this point numbered 7,498 amounting to \$4,356.14 as compared with 5,211 pieces at the Old Faithful museum amounting to \$2,824.50.

Twelve lectures were given daily at the main points of the loop. The 3 lectures given each evening at Mammoth were attended by 35,742 persons for the season; the 2 at Old Faithful by 182,276; 1 at West Thumb by 4,170; 2 at Canyon by 37,064; 2 at Lake by 26,014; 1 at Fishing Bridge by 21,831; and 1 at Tower Falls by 3,546 persons. In addition, several lectures were given throughout the day by ranger naturalists on Mount Washburn. Illustrated lectures were instituted at two places during the past season, namely, Mammoth Lodge and Old Faithful museum. The total lecture attendance for 1929 was 324,969 against 277,254 for the previous season.

Eighteen guide trips were conducted daily in Yellowstone Park during the past season; 87,192 persons availed themselves of this activity. Two additional hikes were established this year, namely, a nature-guide trip from Fishing Bridge auto camp and a twilight hike over the formations at Mammoth. The totals on the guide trips at the various points were as follows: Mammoth, 19,142; Old Faithful, 34,655; Lake, 7,453; Fishing Bridge, 1,649; Canyon, 12,361; Tower Falls, 1,942. In addition to this the tourists traveling on the yellow busses were accompanied over the West Thumb Basin. The total for these trips was 7,990.

Nature Notes from Yellowstone Park have been issued each month and franked to approximately 425 newspapers, libraries, and individuals. The 1929 Ranger Naturalists Manual of 205 pages was issued in June. This manual contained the results of historical research throughout the winter as well as many scientific and popular articles written by the Yellowstone staff and scientists interested in the park.

*IMPROVEMENT BY PUBLIC UTILITIES AND INDIVIDUAL OPERATORS**YELLOWSTONE PARK TRANSPORTATION CO.*

Garage compounds were completed at Old Faithful, Lake, and Canyon. Old garage building removed from behind Old Faithful Inn.

YELLOWSTONE PARK HOTEL CO.

Additions to boiler room and alteration of kitchen started at Old Faithful Inn. New lobby and kitchen alterations completed at Lake Hotel. Dormitories for bus drivers started, consisting of two buildings of 60 single-bed capacity each with wash-room building between.

*YELLOWSTONE PARK LODGE AND CAMPS CO.**LODGES*

Mammoth.—Entire layout repainted, but no changes or additions; total number of cabins 252, house capacity about 700.

Old Faithful.—Six new cabins, total 309; capacity 750.

Lake.—Fifty-one new cabins, total 233; capacity about 550. Laundry building completed which will serve Lake, Fishing Bridge, West Thumb, and East entrance. Porte-cochère completed.

Canyon.—Fifty-six new cabins, total 256; capacity about 700. Three 4-room dormitories completed and two double comfort stations started. Linen room with 30-capacity dormitory above started.

Roosevelt.—Twenty new cabins, total 43; capacity about 130.

Sylvan Pass.—No changes, 11 tent cabins; capacity about 20.

HOUSEKEEPING UNITS

Mammoth.—Thirty-five new permanent type cabins, total 117; capacity about 300.

Old Faithful.—One hundred and six new tent cabins, total 256; capacity about 650; 60 permanent type cabins under construction. Office building with 24-capacity dormitory above completed.

West Thumb.—Thirty-one new tents, total 45 tents; capacity about 100. Built on new site, including building of two streets behind ranger station. Old tents entirely removed from auto camp.

Fishing Bridge.—Office building, with 24-capacity dormitory above, completed. Double comfort station completed. Thirty-six new tents, total 160; capacity about 490; 60 permanent type cabins under construction.

Canyon.—One hundred forty-one tents; capacity about 275. New double comfort station started. Cafeteria and office building, with 40-capacity dormitory above, completed.

Tower Falls.—Five new tents, total 25; capacity about 60. Moved onto a temporary location.

HAYNES PICTURE SHOPS

New studio building at Mammoth which has girls' dormitory above of 26 capacity.

HAMILTON STORES

Old Faithful.—New store, 150-foot frontage, with 48-capacity dormitory above, under construction in auto camp.

Fishing Bridge.—Duplicate of above store started.

YELLOWSTONE PARK FUEL CO.

Fuel compounds for sale of split wood were constructed at Mammoth, Old Faithful, Fishing Bridge, and Canyon.

FRANCHISES AND PERMITS

Nine saddle horse permits were issued during the year, three permits to take motion pictures, and three truck permits.

UNITED STATES COMMISSIONER'S COURT

Hon. JOHN W. MELDRUM, Commissioner since 1894, presiding

Proceedings were had in 14 cases during the year. There were 14 convictions. A total of \$1,041 in fines, exclusive of costs, was imposed. There were 8 cases involving violations of traffic regulations, 5 cases involving violations of the Federal Prohibition act, and 1 case of assault.

POST OFFICE DEPARTMENT

C. C. Marsh was appointed assistant postmaster, effective May 1, 1929. The five postal stations maintained during the season of 1928 were reopened at the beginning of the season of 1929. One of them, Old Faithful, was reopened as a classified station, instead of a contract station as heretofore; the other four—namely, Lake Outlet, Fishing Bridge, Canyon, and Tower Falls—were continued as contract stations. The star route connecting these stations was continued for the tourist season, and additional star route service was provided to connect the main post office with West Yellowstone, Mont., and Old Faithful postal station with the same point, for dispatch of certain mail for

the southwest that could be thus facilitated in delivery. The postal service shows a steady increase in business, in proportion to the increased tourist travel to the park.

PUBLIC HEALTH SERVICE

H. B. Hommon, sanitary engineer in charge of sanitation work in the national parks, spent the period from June 21 to July 4 in the park on sanitation matters.

The Public Health Service continued to keep an assistant surgeon in the park to aid in safeguarding health. Dr. Frank G. Grace, of Minnesota, was appointed to the position vice Dr. Howard C. Anderson, of North Dakota.

Dr. R. R. Spencer, of Washington, D. C. was sent to the park in order to make an investigation of conditions affecting an epidemic which resulted in sickness to guests and employees.

BUREAU OF ENTOMOLOGY

Dr. J. C. Evenden of the Coeur d'Alene, Idaho, office of the bureau made two trips into the park during the summer to look over insect infestation conditions. One of his assistants, a Doctor Balch, was engaged in the insect infestation work in the Bechler River section for a part of the summer.

BUREAU OF PUBLIC ROADS

Several members of the Bureau of Public Roads, including Dr. L. I. Hewes, regional director, San Francisco, A. E. Palen, district engineer, Denver, and Shirley Bright, construction engineer, San Francisco, paid visits to the park during the summer in connection with the bureau's activities.

BUREAU OF FISHERIES

Egg collecting at Yellowstone and Fish Lakes was carried on during the summer. The total collection of black spotted trout eggs from park waters was 14,655,000. The plants within the park from the spawn just collected consisted of 7,060,000 fingerlings and 92,000 eyed eggs. Shipments of eggs or fry to points outside the park totaled 6,879,200. District Supervisor C. F. Culler was in charge of this work.

Fred J. Foster, special fish-culturist for the National Park Service and the Bureau of Fisheries, spent most of the summer looking into fish conditions.

M. C. James, assistant chief of the division of fish culture from Washington, D. C., spent the period from July 11 to 18 in the park.

CARNEGIE INSTITUTION OF WASHINGTON, D. C.

Dr. Arthur L. Day, director of the geophysical laboratory of the Carnegie Institution, and Dr. E. T. Allen and Dr. H. L. Mason of the same institution were engaged in research work during the summer.

HOSPITAL AND MEDICAL SERVICE

Dr. George A. Winsdor, operating the Yellowstone Park Hospital at headquarters, reports the following cases cared for: Sixty-three accidents (40 minor, 23 major); 56 surgical operations (27 minor, 29 major); 31 contagious; 225 sick. A total of 4,230 were treated in the hotel and camp dispensaries. There were seven deaths in the park. Approximately 1,700 calls were made by the resident physician during the year.

SUBCOMMITTEE OF HOUSE APPROPRIATIONS COMMITTEE

The following members of the subcommittee of the House Appropriations Committee for the Department of Agriculture entered the park at the north gate on July 21 and left via the same gateway on July 22: Representatives L. J. Dickinson (Iowa), John W. Summers (Washington), John N. Sandlin (Louisiana), and James P. Buchanan (Texas). They were accompanied by William A. Duval, clerk, and R. Y. Stuart, Chief Forester of the United States Forest Service.

DONATIONS

Roadside clean-up work being financed by a friend of the park was continued this year with the donation of \$10,000.

The construction of a fish hatchery at Lake Yellowstone for which \$15,000 was donated by W. E. Corey of New York City, has continued and at the present time the large fish hatchery which will house hatching troughs, aquarium, and office is complete except for installation of some of the fixtures. A 30-man bunk house and a 30-man kitchen will be completed this fall.

The museum construction under the donation of \$118,000 by the Laura Spelman Rockefeller Memorial has been reported upon under building construction. Approximately \$23,000 of this fund has been expended.

Considerable activity has developed in the purchase of lands north of the park for which funds have been made available this year to enable us to match private donations which at the present time have totaled \$37,000.

Several donations were made to the Yellowstone Park museum by residents of Cooke City, Mont. A number of books received from the American Museum of Natural History through Field Naturalist Carl Russell were added to our library collection. J. E. Haynes, authorized park photographer, donated a picture of John Yancey, an old-time resident of the park, as well as 50 hand-painted lantern slides for the use of the educational division and for museum purposes. Harrison Crandall, authorized park photographer in the new Grand Teton National Park, donated several pictures of the Tetons for use in this park.

YOSEMITE NATIONAL PARK

C. G. THOMSON, Superintendent, Yosemite National Park, Calif.

ADMINISTRATION

There were numerous changes in personnel during 1929, including the appointment of C. G. Thomson as superintendent by transfer from Crater Lake vice W. B. Lewis, now become assistant to the director at Washington; the appointment of C. A. Harwell as park naturalist vice C. P. Russell; the appointment of Russell Sprinkel as chief clerk vice Roy A. Hanna; J. W. Emmert, designated as assistant to the superintendent, coordinated all outside work with striking ability. J. V. Lloyd's services earned him promotion by designation as assistant to the superintendent. There were numerous changes in the office and elsewhere.

In general, Yosemite enjoyed a fine season with excellent travel; a high order of service much appreciated by the public; a minimum of disorder; a record freedom from destructive forest fires, insect infestations, and other forest menaces; and a very satisfactory progress in essential construction.

Appropriations.—Appropriations for the fiscal year included \$325,000 for administration, protection, and maintenance; \$87,360 for construction; and for road and trail construction we spent during the fiscal year \$340,256.90. We received authorized funds in the amount of \$612,500. There were also available very large private and congressional sums for purchase of private lands within the park still to be expended after completion of studies now under way.

CONSTRUCTION

It was a record year for new construction work, necessitated by a sustained increase in travel. Out of a wide miscellany of jobs I am listing only the most important projects.

1. *National Park Service construction.*—Placement of curb rock and construction of ditches to protect several miles of meadow from encroachment of automobiles; completion of the winter picnic ground near Yosemite Lodge, including frost-proof comfort stations provided with hot water; placement of picnic tables, stoves, etc.; completion of two new residences for employees; completion of four garages containing space for nine cars; a new hospital under construction near the Indian Village at a cost of \$50,000; construction of a settling tank for the valley water supply; and installation of auxiliary pumps for the sewer system.

2. *Roads and trails, Park Service force account.*—An extensive paved circulation and parking area with capacity for 750 cars was constructed at Camp Curry, relieving a very difficult situation at this point; rock curbing and traffic

marking was completed at the Mirror Lake, Camp Curry, and Happy Isles parking areas; on the floor of the valley certain road pavements, paved parking areas, paved footpaths, a new log footbridge, and oiled bridle paths were completed; certain road shoulders were widened; road fill and pavement were completed over the new Happy Isles bridge; roads leading into Camp Curry were graded and paved; connecting pavement at Pohono bridge was completed; a very high standard trail from the valley floor to Glacier Point (4 miles) was completed; the trail from Happy Isles to Vernal Falls was reconstructed and surfaced and a fine new footbridge constructed; the Mist trail was reconstructed and 800 lineal feet of welded handrail placed; a trail was built up the river from Lost Valley toward Merced Lake; 8 miles of the Big Oak Flat road were radically improved; and 15½ miles of right of way on the Wawona road were cleared by Park Service crews in advance of the Bureau of Roads construction.

The above work required the operation of 10 messes in various parts of the park and the services of 27 foremen.

These and a multitude of smaller construction and maintenance jobs were accomplished under the direction of Park Engineer O. G. Taylor. Baffling as some of these diversified problems were, he overcame all difficulties with a technical skill and a tireless application that won my sincere admiration.

3. *Construction—Bureau of Public Roads.*—Under the supervision of Resident Engineer H. S. Tolen, of the Bureau of Public Roads, 2.1 miles of road were graded northward out of Hoyle Camp by T. E. Connolly and 4.5 miles of road were graded northward out of Eight-Mile by W. A. Bechtel, sublet in August to J. W. Collins. A new contract for the grading of the road from Eleven-Mile to Grouse Creek was let under bureau auspices. A very appropriate reinforced concrete bridge faced with large stones was constructed at Happy Isles; intensive studies of future road programs were continued with certain essential surveys, particularly the survey of the proposed routes through Wawona to Four-Mile and from Bridal Veil Falls to Turtleback Dome.

MAINTENANCE

Roads and trails.—An enormous amount of maintenance was accomplished during the year, including snow removal and repair following spring run-off, and later the upkeep demanded due to intensive travel. Notable in road maintenance was the oiling of the Wawona road in its entirety and the oiling of the Big Oak Flat road from the Valley floor to Gentry and from Gin Flat to the western boundary; the Glacier Point road was also oiled; in all a total of 66 miles. This improvement was the source of profound satisfaction among park visitors, especially those expecting the intolerable dust previously encountered. In general the roads were well maintained, but our 660 miles of trails were woefully undermaintained due to the availability of only about \$10 per mile for their maintenance.

Buildings.—A large amount of repair, painting, etc., was accomplished upon park buildings. However, we have so many such structures—principally frame structures of too cheap construction to withstand our rigorous climate—that under present maintenance allotments their condition must inevitably be progressively downward.

Electric system.—There was a considerable extension to the electric distribution system necessitated by additions to both park and operators' facilities. The maintenance was excellent and the seasonal shortage of power was provided for by purchase of energy from the San Joaquin Light and Power Corporation, which corporation also purchased our excess output. Under a contract now in preparation the San Joaquin Light and Power Corporation is expected to furnish park operators hereafter with their light and power needs and to provide a stand-by service for the Government. In line with landscape requirements, all services to new units were installed underground and some progress made in the effacement of old lines. During the year ending June 30, 1929, 7,731,730 watts were generated, 2,969,693 watts were purchased, and 4,978,411 watts were sold, at a net profit of \$15,552.77.

Sanitation.—Sanitation was excellently performed. A general clean-up covering as much area as funds permitted netted excellent returns in park appearance and unquestionably was reflected in the improved orderliness and the general attitude of the public. Garbage collection was scrupulously maintained, grossing 1,850 tons, of which 352 tons were sold for hog feed. The incinerator functioned very well and at a cost of \$2.86 per ton, or 17½ cents per can. The

placement of 153 strong and appropriate garbage stands was well worth their cost of \$6.35 each, as was the green lacquering of garbage cans at 49 cents each.

Weekly analyses of water samples of the valley water supply demonstrated its uniform potability, and tests of the Merced River water demonstrated that there was no undue pollution from bathers and other contaminating influences. Milk samples tested at the State dairy laboratory showed a satisfactory bacteria count, thanks to careful handling by the dealers.

All circulation areas, camp grounds, etc., have been regularly policed by clean-up squads, latrines have been installed and moved as needed, and some effort expended in the eradication of flies, mice, and ground squirrels.

Mosquito control accomplished early in the spring brought excellent results on the valley floor and in the Tuolumne Meadows and elsewhere.

On the Valley floor the sewage farm was overtaxed, resulting in very offensive odors during the period of peak load, which coincided with the warmest weather. Mr. Hommon's excellent plan for an adequate sewage-disposal plant was submitted to the service for consideration of the Bureau of the Budget and Congress. Fortunately our sanitary problems are in excellent hands.

Mechanical department.—Our mechanical department has in the main, kept abreast with the extensive demands necessitated by the upkeep of a very large and widely scattered miscellany of machinery and road equipment. Unfortunately the pressing need for the use of equipment has necessitated emergency repairs rather than a periodical overhauling, so that the tendency in the condition of equipment is downward in excess of wear and tear. Plans are under way to take up some of this slack during the winter months.

It is worthy of record that the purchase of some modern equipment, secured largely through the office of the chief engineer, has been attended by considerable reduction in repair costs, a reduced loss of time, and a lessened unit cost on various construction and maintenance jobs. The elimination of other antiquated equipment (especially the war surplus equipment) would mean another distinct stride forward.

Much of the efficiency with which our wide miscellany of construction and maintenance jobs have gone forward is due to the smooth functioning of our service operations department under the supervision of Frank Ewing.

LANDSCAPING

John Wosky was assigned to Yosemite throughout the construction season from the office of the landscape architect. No construction job or important maintenance operation was undertaken without his prior approval. His contributions were multitudinous and highly essential.

USE BY THE PUBLIC

The outstanding feature of the season's travel is the apparent stabilization of Yosemite travel for the third successive year at a little less than a half-million visitors. At no time except on Memorial Day and the Fourth of July was there any congestion, even on the floor of the valley, nor at any time was there such overcrowding as to break down the service of the operators or of the park to visitors. Almost uniformly our visitors were quiet, orderly, and appreciative of what we were able to do for them.

Travel via private motor vehicles, by entrance stations and roads

Entrance station	Road	Number of automobiles		Number of people		Motor cycles			
						Number		People	
		1929	1928	1929	1928	1929	1928	1929	1928
Arch Rock.....	El Portal.....	84, 183	78, 549	270, 400	252, 512	136	140	159	177
Mariposa Grove.....	Wawona.....	12, 498	18, 544	40, 562	63, 333	17	1	23	2
Alder Creek.....	do.....	9, 425	8, 421	27, 614	27, 053	9	7	14	13
El Capitan.....	Big Oak Flat.....	11, 010	10, 065	32, 366	29, 984	15	12	19	17
Aspen Valley.....	Tioga.....	5, 933	7, 369	16, 333	20, 270	1	11	1	14
Tioga Pass.....	do.....	7, 359	6, 896	20, 592	19, 820	18	6	21	7
Mather.....	Hetch Hetchy.....	2, 490	1, 668	8, 097	5, 610	3	0	3	0
Total for all stations.	-----	132, 903	131, 512	415, 964	418, 582	199	177	240	230

Travel via private motor vehicles, by entrance stations and roads—Continued
SUMMARY OF VISITORS

	1929	1928
Total people by private automobiles.....	415,964	418,582
Total people by motor cycles.....	240	230
Total people by Yosemite Valley R. R.....	12,230	11,277
Total people by stages (other than El Portal stage).....	31,806	30,019
Total people by wagon, horseback, and on foot.....	1,017	511
Grand total visitors to Yosemite National Park.....	461,257	460,619

The camp grounds were never crowded beyond capacity. Campfire entertainments were held every night in Camp 7 and for over a month and a half were also held in Camp 14; the entertainments were furnished by our naturalist and ranger personnel plus volunteer talent among the campers; these entertainments were much appreciated and were attended by an average of over 400 campers nightly. There was considerable complaint among campers regarding the lack of hot shower baths, free fuel, and certain other facilities offered gratis to campers in some other parks.

There was a slightly increased use of the camps and trails in the high country, particularly by hikers. There was a heavy increase in the public use of bus transportation both to and from the park. The use of saddle animals increased notably, due largely to the intense personal interest of Dr. Don Tresidder. Skilled fishermen were amply rewarded for their efforts, and even the unskilled were uniformly successful in making takes of the limit in scores of lakes and streams of the high country. Thousands of bathers enjoyed the streams and lakes of the park without accident. The various licensed operators functioned without breakdown anywhere. Apparently almost every person employed in the park found it a privilege as well as a duty to serve the public. I can not praise too warmly the fine spirit of service and mutual aid that imbued both the Park Service and the public utility employees.

MUSEUM AND PARK NATURALIST

The educational work of the year was very successful. The museum functioned excellently, particularly during the summer season when it was handling enormous numbers of people. During this period the educational staff was increased from 2 naturalists to 10. An estimated total of 439,852 people were served at the museum, 12,265 were conducted on field trips—possibly the most important aspect of the department—and 179,587 were served at outpost stations and attended lectures.

The lookout station at Glacier Point functioned all summer, and the assigned ranger-naturalist maintained an attractive flower exhibit; a temporary outpost station was installed at the Mariposa Grove with pictures and other exhibits to dramatize the story of the sequoias. The ranger-naturalists contributed greatly to the success of the evening camp fires in the camp grounds on the floor of the valley and similarly at the Tuolumne Meadows and elsewhere. The fifth session of the Yosemite School of Field Natural History was successfully conducted by Dr. H. C. Bryant with a full quota of 20 students from different localities in the United States.

The naturalist department wrought an incalculable service, its activities weaving back and forth like a shuttle, imposing a pattern of interpretation upon our general usefulness. There can be no definite measurements of the results of this work, which undoubtedly has enriched the lives of thousands.

PROTECTION

The permanent ranger department numbered 16 men, and 38 temporary rangers were added to our summer force. The entire ranger force, both permanent and temporary, was composed of exceptionally good men imbued with the idea of service. To increase their usefulness each man reported to the park naturalist and was trained as much as time permitted in the educational features, and their aggregate contribution to the educational work was very large. One ranger was assigned to each camp ground—a much appreciated and very useful innovation. At the Mariposa Grove, Gentry, and Aspen

Valley the rangers installed small exhibits that were the subject of considerable favorable comment. There was a union in effort between the ranger service and the educational service that was productive of splendid results. One serious administrative shortcoming was the employment of the majority of the temporary men during the height of the summer season instead of just before the onset.

The Government participation in winter sports was entirely in the hands of the rangers, and they did well with a woefully limited personnel and without specific funds for the purpose. Their maintenance of the "Ash Can Alley" slide and of the river skating pond (both free) was an excellent public service rendered by them through long hours of overtime. In emergencies the rangers responded with courage and energy. Innumerable "lost" visitors were restored to their people.

There was one tragedy—the death of a 12-year old boy, Forrest Case, who was swept over Vernal Falls.

Public order.—Out of a total of nearly half a million visitors there were only 20 cases sufficiently serious to place before the commissioner. Due to insufficient ranger personnel and to other causes, there was inadequate patrol of park terrain, particularly the high country and the passes through which grass and game poachers may trespass. It is expected that this inadequacy will be corrected in part next year, and particularly that rangers will participate in the initial opening and signing of trails.

Forest fires.—Due partly to the availability of fire-prevention funds and partly to a rather favorable weather condition, there were only 20 fires in the Yosemite forests, which destroyed a total of 9 acres. This is a record in Yosemite's history. Our ranger personnel and others involved were specially trained previous to the fire season at a school conducted by Fire-Control Expert Coffman, and later two key men were more intensively trained at the fire school conducted by the Forest Service at North Fork. The whole park force was dominated by an excellent alertness throughout the season, so that small fires were handled very promptly. With special funds for the purpose, our fire equipment, telephone lines, and other fire-fighting facilities were notably increased and improved and have proven a fine investment. The most important fire precaution was the clean-up of the forest floors in the Mariposa, Toulumne, and Merced Groves of Big Trees, removing one of the critical threats to those invaluable areas.

Insect pests.—Forest insects were under scrutiny of Doctor Miller, of the Bureau of Entomology, with Ranger Charles F. Adair detailed at his suggestion. There are no infestations of epidemic nature, but susceptible trees throughout the park are being killed by insects which are present in sufficient numbers to necessitate close observation and probably minor control operations along avenues of travel.

FAUNA AND FLORA

Fauna.—Bears are slightly increased in numbers. They were the source of greatest interest to visitors and of real concern to us, sending 31 persons to the hospital for medical attention and being quite destructive. Deer were so numerous in the valley as to be destructive to plant life, but in the Tuolumne watershed they have not recovered from the decimation during the foot-and-mouth disease outbreak in 1924. During a 6-day pack trip through that area I saw only one deer. Other wild life seems balanced as previously, except mammals, which are very scarce. The large gray squirrel, almost eliminated in recent years by some unknown unfavorable influence, seems to be gaining a new foothold, about a dozen having been seen this summer.

Flora.—The forests have been free from epidemic infestation, though there is danger of devastation in certain areas. On the valley floor wild flowers are diminishing in numbers, due principally to grazing deer, but in the highland meadows flowers were amazingly abundant and beautiful. This is not true, however, of the areas opened to grazing cattle; the meadows and slopes have been sadly denuded of grass and wild flowers, and even the low shrubs have been reduced by browsing.

PARK OPERATORS

The Degnan store and the Best, Boysen, and Foley studios operated as heretofore.

The Yosemite Park and Curry Co.'s most outstanding improvement was the construction of the new cafeteria and dining room at Camp Curry. These

units opened on May 10, 1929, at a cost of nearly \$250,000. They are appropriate structures with the most modern equipment, the cafeteria seating 900 people and the dining room 750. The company also made minor improvements too numerous to record here. Their six hikers' camps operated more successfully than heretofore—a fact that seems to herald the eventual success of these excellent projects. I can not commend too highly the fine attitude of the officials and staff of the Yosemite Park and Curry Co.

Hospital.—The Yosemite Park Hospital was operated under the direction of Dr. Guy A. Hunt. During the year there were 3,183 patients treated, 10 major operations and 10 minor operations performed, 12 births, and 8 deaths. The park dentist treated 300 patients.

COOPERATING AGENCIES

Invaluable assistance was rendered Yosemite by various outside agencies. H. B. Hommon, of the Public Health Service, very efficiently supervised our sanitary problems; the California State Fish and Game Commission operated the State fish hatchery in the park as heretofore and we are also indebted to this State organization for the loan of Dr. H. C. Bryant to our educational staff; the Bureau of Public Roads contributed as reported above; the Bureau of Entomology through Doctor Miller and Doctor Burke; the mutual problems presented at Hetch Hetchy were studied with officials of the city of San Francisco; the California State Automobile Association contributed the fine services of Arthur Gordon at our information office and the services of Engineer Johnson in a careful study of our vexing road-sign problems; with Harold C. Conkling, chief of the State division of water rights, we have undertaken a program for estimating summer run-offs from our high country in relation to California water supplies; through the generosity of George Wright, of the Park Service, a survey of certain wild-life problems is being conducted by himself and Joseph Dixon of the University of California; the Weather Bureau contributed instruments and telegraphic advice of periods of critical fire hazard; the Forest Service was uniformly helpful in our mutual problems; the State of California continued to operate and support the grade school in Yosemite Valley for the children of local residents. A small addition was made to the school building at State expense.

United States Commissioner W. D. Fullerton, tried 20 cases during the year. There were 17 convictions, a total of \$590 in fines, and 60 days' jail sentence.

The Yosemite Board of Expert Advisors, composed of Frederick Law Olmsted, Duncan McDuffie, and John P. Buwalda, continued in being. These distinguished gentlemen gave considerable of their time to a painstaking study of Yosemite conditions; some of their decisions have relieved situations that are immediate, but in the main their studies are far-sighted influences of Yosemite's future development.

RECOMMENDATIONS

It seems to me that in general Yosemite's so-called problems are nearing solution after several years of maneuvering and thought. The resident Indians, for example, have no legal rights, but do have a moral right that must be zealously respected. A comparatively small appropriation would provide for their housing in an appropriate area, and we would then have solved this perplexing problem and would have no other important task with them except to prevent the influx of other Indians into these favorable living conditions.

Hetch Hetchy seems reducible to a solution that will salvage the residue of its park value by development aimed only at its worth as a magnificent spectacle and at our grave responsibility for safeguarding the purity of impounded waters.

It is becoming increasingly obvious that the Lake Eleanor Dam should be closed for all purposes except hatchery activities which will enhance general park fishing.

Although we occasionally hear talk of limiting travel into the valley, it is my opinion that the valley will always be the main magnet of travel, particularly from States other than California. Californians themselves comprise some 85 per cent of our travel, but their tendency seems to be to return more and more to the high country. If Yosemite is to contribute its full value to the Nation and is to justify California's faith in giving it into Federal control, this high country must be made more accessible by the improvement of roads,

by better trails, by much better fishing, by more high country camps, by the extension of the naturalist and ranger services, by the safeguarding of water supplies, by the erection of log lean-to shelters, and other appropriate devices that will encourage the use of this superlative high country and yet not develop to the point of destroying its virginal quality.

In the valley the tendency in development is to duplicate antiquated structures rather than to extend living facilities. For example, rental cabins seem inevitable, but they merely use some of the acreage formerly devoted to camping, which is evidently gradually declining in favor of the comfort of these economical cabins. It is of genuine interest that while there is much talk of the overdevelopment of Yosemite Valley, actual measurement shows only 474 acres devoted to Government and concession activities in the valley (exclusive of roads and trails) and a total of less than 600 acres utilized in a total park area of 720,142 acres.

The following are among our most urgent administrative needs:

1. The addition to our facilities of the type of housekeeping cabins common to other resorts on the Pacific coast.
2. Additional allotments to improve and maintain trails.
3. Improvement of housing conditions for both Park Service and operators' employees.
4. An adequate water supply at the Mariposa Grove of Big Trees in advance of the opening of the new Wawona Road.
5. The assignment to Yosemite of a permanent competent forester.
6. A heavy increase of fish planting in our lakes and streams.
7. Yosemite's service to campers should be on a parity with the service rendered in other parks.

ZION NATIONAL PARK

EIVIND T. SCOYEN, Superintendent, Springdale, Utah

During the year the following events were of more than the usual importance in the history of Zion Park:

1. Steady progress on the park's greatest construction job—the Zion-Mount Carmel Highway.
2. Increase in travel of 11 per cent.
3. Steady improvement of near-by transcontinental highways, featured by opening of the Lees Ferry Bridge on June 15, 1929.
4. Start of topographic mapping by United States Geological Survey.
5. Substantial progress in development of educational activities.
6. Further extension and improvement of tourist facilities.
7. Extension of park activities to include the administration of Bryce Canyon National Park.
8. Reconstruction of footpath from Temple of Sinawava to the Narrows.
9. Further progress in studies of boundary adjustments.

ADMINISTRATION AND ORGANIZATION

Zion National Park was created by an act of Congress approved November 19, 1919. Its area amounts to 120 square miles.

The park force consisted of a superintendent in charge of all park operations, a supervisor in charge of maintenance and construction, chief ranger in charge of protection activities, chief clerk in charge of office operations, and a park naturalist (temporary) in charge of the educational program. Other appointive employees consisted of a mechanic, two permanent rangers, three temporary rangers, and one temporary clerk. Day labor was hired as needed.

WEATHER CONDITIONS

The year was practically normal from the standpoint of temperature, but far below normal in the amount of precipitation.

During the year the highest temperature was 105° on July 2, and the lowest was 2 below zero on January 24.

Weather records for the calendar year of 1928 reveal the interesting fact that from the standpoint of a combination of heat and drought it was without a parallel in this section since records began in 1904. The mean temperature of 63° was the highest ever to be recorded, while the total precipitation of 8.95 inches was the smallest amount to fall with one exception. Although the severe temperature conditions did not prevail in 1929, the drought was practically unbroken until August of this year.

PARK TRAVEL

With all records broken for the total number of visitors during the 1929 season, it is evident that there is a steadily increasing national and international interest in the southern Utah scenic wonderlands. The travel to Zion Park has more than doubled since 1925.

Due to bad road conditions on account of heavy blizzards across Wyoming and northern Utah, motor travel started using southern routes, and as a result winter travel to Zion was far below last year. Not until May did our monthly records show an increase, but during the summer season substantial increases were registered each month.

The total number of visitors to the park was 33,383. This was an increase over last year of 3,367, or 11 per cent. The heaviest travel during any month was in July, when 8,546 visitors were registered.

Of the total, 28,201 came in 8,612 automobiles, an increase of 1,094 in the number of autos and 3,190 in the number of passengers; 5,151 came by stage, an increase of 211; and 31 by miscellaneous means.

Visitors were registered from every State in the Union, District of Columbia, Hawaii, Alaska, Philippine Islands, and 22 foreign countries.

The following is a comparative table showing park travel:

Year	By automobile		By stage (rail)	Miscellaneous travel	Total visitors
	Cars	Passengers			
1929.....	8,612	28,201	5,151	31	33,383
1928.....	7,518	25,011	4,940	65	30,016
Increase.....	1,094	3,190	211	-----	3,367
Per cent.....	14	12	4	-50	11

The following table shows park travel by months:

Month	By automobile		By stage (rail)	Miscellaneous travel	Total, 1929	Total, 1928
	Cars	Passengers				
1928 ¹						
October.....	428	1,317	41	3	1,361	1,050
November.....	138	365		3	368	540
December.....	54	179		5	184	232
1929						
January.....	84	204		1	205	285
February.....	61	135	50	3	188	296
March.....	231	925		1	926	1,096
April.....	268	905	3		908	1,671
May.....	653	2,242	106	1	2,349	2,159
June.....	1,816	5,760	1,209	6	6,975	4,949
July.....	2,041	6,763	1,778	5	8,546	7,054
August.....	1,854	6,359	1,355	3	7,717	6,858
September.....	984	3,047	609		3,656	3,826
Total.....	8,612	28,201	5,151	33	33,383	30,016

¹ The park travel year is from Oct. 1 to Sept. 30 of the year following.

During the year 9,031 people in 2,555 cars camped in the one public auto camp ground.

PARK SERVICE ACTIVITIES

Construction.—Every effort was made to rush construction work. Dragging the improvement program along throughout the entire year increases the overhead of park operations. Early in the spring I therefore issued instructions that all of the construction work, both in Zion and Bryce, would be programmed for completion by October 1. This program was carried out with the exception of the superintendent's residence in Zion, which is 60 per cent complete.

The following buildings were completed: Warehouse, residence, checking station at south entrance, barn at headquarters, and the interior of the park administration building was reconstructed.

The following other improvements were completed: Water, sewer, and electric system at headquarters, new water and sewer system at the public auto camp, and trails to Hidden Canyon and the Narrows.

Maintenance.—Park forces maintained $7\frac{1}{2}$ miles of roadway, 38 miles of trails, 12 miles of telephone line; 11 buildings, valued at \$26,000; 1 public auto camp ground with a capacity of 60 cars; 2 water and sewage-disposal systems, one in the administrative area and the other in the public auto camp; an electric system at park headquarters which is connected to the lines of the Dixie Power Co.; and equipment consisting of 9 trucks, 2 passenger cars, 2 air compressors, 1 water pump, and miscellaneous items.

Ranger activities.—One additional permanent ranger was authorized and the force now consists of a chief ranger, two permanent rangers, and three seasonal rangers. Work during the year consisted of traffic control, fire protection, assisting in educational work, general police duties, patrol work, and all the miscellaneous duties which generally are the lot of a ranger.

Due to the fact we are so distant from the nearest United States commissioner, we only make arrests for serious infractions of park regulations. As there were no flagrant violations, no arrests were made. However, rangers handled several cases of disorderly conduct by turning them over to the county officials, who gave fine cooperation.

Education.—This department consisted of a park naturalist (temporary) and one ranger naturalist. In addition, one of the permanent rangers assisted in the information office.

During the summer months the program of work called for nature guide trips from the Temple of Sinawava to the Narrows twice daily. These were preceded by lectures in the Temple. In the evening lectures were given at the auto camp ground and Zion Lodge, and the information office and museum was kept open daily.

A summary of the season's work shows that 312 lectures were given, which were attended by 12,350 persons, and 4,240 people were conducted on 137 nature guide trips.

In addition to the above work a great amount of research was accomplished.

The present building, originally built as a ranger station with an information office in front, became so crowded with museum exhibits that it was necessary to enlarge the information office space, and at present we have no space available for rangers, as the entire building is used for museum purposes. During the year a total of 8,568 people visited the museum, making a total of 25,761 served by the educational division.

Office work.—The office force consisted of a chief clerk and one temporary clerk. Work consisted of purchasing, keeping accounts, disbursing, correspondence, reports, filing, etc.

Equipment purchased.—The following major items of equipment were purchased: one 30-horsepower caterpillar tractor, two light Ford trucks, one 3-ton Reo dump truck, Buick sedan, concrete mixer, heavy-duty grader, water pump, safe, three office desks, and minor items.

Engineering division.—During the period from April to October Guy D. Edwards, assistant engineer of Mr. Kittredge's staff, was on duty in the park. He handled all details of our construction program. This assistance was very necessary and is very much appreciated.

PARK WILD LIFE

Deer are evidently on the increase, as they are seen more frequently each year and are also becoming much tamer. Several times they were observed in the public auto camp ground and one night two does spent about an hour grazing in front of Zion Lodge.

Mountain sheep were seen several times by workmen on the Zion-Mount Carmel road. They seem to be increasing under park protection, and the proposed boundary adjustments along the east line will include some of the range of this animal now outside of the park.

Predatory animals have not been bothersome, and no special effort has been made to hunt them. During the winter Government hunters were very active in hunting mountain lions outside the park and were very successful in their operations. No doubt they secured a number of these animals whose range extends into Zion Park.

Last fall Chief Ranger Jolley had the unusual experience of seeing four lions at one time and meeting them in a blind canyon in very close quarters. However, the brush was very thick and the animals quickly made their escape. In all the years I have spent roaming over one or another of the national parks I have never seen a mountain lion running wild.

Our most serious pest from the animal standpoint is the pocket gopher. Practically the entire canyon floor is undermined with his tunnels, and he is very destructive to young trees. During the year I called in rodent experts of the Biological Survey, and on their recommendation some control work was started. However, it will have to be much more extensive if noticeable results are to be secured. The pocket gopher is now recognized as a most serious problem in forest protection throughout the entire country.

ROAD AND TRAIL CONSTRUCTION

Zion-Mount Carmel Highway.—Under direction of the United States Bureau of Public Roads work progressed steadily on this great project. At the close of the period covered by this report only one contract remained to be advertised, and this is for surfacing on section 3. It now appears that the road will be open to travel about November 15, although two of the bridges will not be completed until spring and some other work will probably be unfinished.

The tunnel, which is the most spectacular feature of the project, was "holed through" on October 20. Work on this 5,607-foot bore was started on November 19, 1928. At one stage of the construction the contractor drove 1,135 feet of the main bore in one month, which is believed to be a record for rock tunneling.

Work remaining to be done on September 30 consisted of paving in the tunnel, guniting part of the surfacing, and placing of guard rail on section 1, bridges across Pine Creek and the Mukuntuweap River, and surfacing on section 3.

Plans are now being made to dedicate the great project on June 1, 1930.

Much of the credit for keeping this work on schedule should be given to the Nevada Contracting Co., and to the Raleigh & Lang Co., who were subcontractors on a portion of the project. When it was necessary to close down road work in the parks due to shortage of funds, these companies never stopped operations but carried on the work with their own funds. When they decided to do this, it was expected that money would be available early in January, but, due to the trouble encountered by the deficiency bill, no payments were possible until March. This condition worked a very great hardship on the contractors.

During the year some prominent people from all over the world visited this project, and all were of the opinion that it is undoubtedly the most spectacular feat of highway engineering ever attempted.

Narrows footpath.—This trail leads for a distance of 1 mile from the Temple of Sinawava to the Narrows, a place where the canyon walls come very close together. Due to the fact that a very large proportion of the park visitors walk over it, we consider it as being a very important part of the park trail system and something entirely different from the usual foot trail.

During the year the entire trail was reconstructed. A surface 5 feet wide of oil-bound macadam was placed. The work was done in such a way that there is no evidence of the artificial surface, but it has the appearance of a gravel path. If anyone who had previously struggled up through the deep sand to see the Narrows could return and walk over the new trail I am sure he would appreciate the improvement.

Hidden Canyon Trail.—This is a new foot trail built from a point on the East Rim Trail around into Hidden Canyon. This is a gorge about 2,000 feet deep and very narrow between Cable Mountain and the Great White Throne. It is a very interesting trip for the hiker with more than the average endurance.

IMPROVEMENT OF APPROACH HIGHWAYS

The Utah State Road Commission is intensely interested in the approach highway system to the parks in southern Utah, and we are especially fortunate because they so often change this interest into constructive action.

Two main highways act as feeders to the parks in this section. One is U. S. No. 91, running from Salt Lake City to Los Angeles, and the other is U. S. No. 89, which traverses the country from American Fork, Utah, south

to Lees Ferry, and thence into southern Arizona. The former is also known as the Arrowhead Trail and the latter as the Grand Canyon Highway.

Improvements on No. 91 consisted of putting an oil-process surface on the road from Cedar City south for 24 miles and rebuilding a portion of the highway south of St. George to the Shewits Indian Reservation. The State of Arizona also let a contract for the improvement of this highway where it crosses the northwest corner of the State, and the State of Nevada is improving the section from Mesquite to the Nevada-Arizona line.

On the main approach highway to Zion, leaving No. 91 at Andersons Ranch, the State made several improvements on narrow sections between Toquerville and Virgin and oiled the road from Virgin for 14 miles to the park boundary.

On U. S. No. 89 the State rebuilt the highway from Panguitch north through Circleville Canyon, built a new section along Kanab Wash, and made many improvements on the section south from Panguitch to Long Valley Junction. This highway will be the main approach to our eastern entrance.

In addition to these improvements the State also completed its section of the Zion-Mount Carmel Highway, one of the most expensive projects it has ever undertaken.

The main development from the highway standpoint the past year was the opening of the bridge across the Colorado River near Lees Ferry. Although the approach highways to this bridge are in very poor condition, a large volume of travel is passing over it, and the importance of this great span across the Colorado is well recognized by all interested in the tourist traffic.

INSECT EPIDEMIC

Early in the spring a defoliating caterpillar attacked the white ash trees in the canyon and completely stripped them of leaves. Although most of the trees recovered from the attack they can hardly be expected to survive many of these epidemics, and it is probable that we will have to engage in control work next spring if the infestation is as virulent as was the case this year.

PERMITS TO OPERATE ON ZION-MOUNT CARMEL HIGHWAY

During the year several applications were received for operating freight, express, and passenger service between Cedar City and Kanab, Utah, using the new highway. As the Utah Parks Co., the public utility operator, offered no objection to the type of service proposed, it was decided that we would grant permits to operators approved by the Utah Public Utilities Commission, provided we were satisfied as to the character of those handling the business.

TOPOGRAPHIC MAP OF THE PARK

During the summer a field party of the Geological Survey spent four months in the park on topographic work. Although fine progress was made, the project is so difficult that another year will be needed to complete the job. The work was in charge of R. T. Evans, topographic engineer and formerly acting superintendent of this park and also formerly superintendent of Hawaii National Park.

DONATION OF LANDS

On March 13, 1929, the Secretary of the Interior accepted the deed of a 66-foot highway right of way 0.4 of a mile long immediately below the south entrance to the park. The land was donated to the Government by the board of county commissioners of Washington County, Utah, after the State road commission had relinquished jurisdiction of the road, which was part of the State road system.

The right of way is across lands within the park boundaries but privately owned, and the acquisition of this strip marks an important step forward in the elimination of these holdings.

The acceptance of the deed added 3.32 acres to the Government holdings.

WINTER OPERATIONS

No regular operation of the lodge was attempted during the winter. Meals were served at the Union Pacific construction camp to any desiring them, but only a very few people availed themselves of this service.

IMPROVEMENT BY OPERATORS

The Utah Parks Co. built five additional cabins of the de luxe type, each consisting of four apartments with bath. They also installed two 150,000-gallon redwood tanks on their water system and made many other improvements to this system. The kitchen at Zion Lodge was enlarged and there were many other improvements of a minor nature. The company also bought twelve 16-passenger closed busses and six Cadillac sedans of special design to add to their transportation facilities.

BOUNDARY EXTENSIONS

On January 28, 1929, President Coolidge issued an Executive order withdrawing from appropriation approximately 13 sections of land around the southeast corner of the park. There are now about 25 sections withdrawn on the east and south boundaries, and during the winter a bill should be introduced to add these to the park and thereby complete the proceeding.

COOPERATION WITH OTHER BUREAUS

During the past year our operations called for cooperation with the following Government departments: Bureau of Public Roads, Public Health Service, Weather Bureau, Forest Service, Geological Survey, Bureau of Mines, Biological Survey, Bureau of Entomology, and the General Land Office.

In addition we had the very close cooperation of State and county officials, especially the State road commissioners, State board of health, and the State land commissioner. As usual, Governor Dern took a very keen and helpful interest in the park developments.

REGIONAL FOREST PROTECTION BOARD

In my capacity as park superintendent I also acted as a member of the regional forest protection board for the area including Utah, Nevada, Wyoming west of the Continental Divide, and Southern Idaho. Attending the meetings of this board has been an education in forest protection, and in addition I have made the acquaintance of practically every person who is a leader in forest protection in the intermountain district. I feel very strongly that this board is a much needed activity and that the results secured are of positive benefit.

ASSISTANCE OF PARK SERVICE OFFICERS

In concluding this report I wish to express my very sincere appreciation of the fine support given me by all of the higher officials of the service. The director, Washington office staff, and members of the field divisions have all contributed assistance whenever requested. The greatest help the past year has come from the engineering division, which has supervised construction and maintenance work in the park and which took a large amount of the detail in equipment purchases off the park force. Without their cooperation in both Zion and Bryce problems, it is impossible for me to see how the park could have operated the past year.

THE SOUTHWESTERN NATIONAL MONUMENTS

FRANK PINKLEY, Superintendent, Coolidge, Ariz.

TRAVEL AND THE PUBLIC

A decided increase in activities is apparent for the present travel year. Travel to the 18 southwestern monuments amounted to 297,501 for 1929 as compared with 257,966 for 1928 and 230,311 for 1927. Added interest in the monuments is shown by the increasing number of "repeaters"—that is, people who have made one visit and visit the monument a second time, bringing with them friends whom they wish to have see these places of interest. The attitude of the general public is very good. They show their appreciation by a willingness to abide by the regulations of the Park Service, and as a general rule express their appreciation of the service they receive. In many instances visitors are rather surprised that such places of interest are to be found on this continent and can be enjoyed without a trip to foreign countries. A fair

percentage of our visitors are citizens of foreign countries. These are among our most interested visitors. We have reason to believe that we are attracting considerable attention from the outside, judging by inquiries received from foreign countries for information about the monuments.

MUSEUMS AND EDUCATION

Museums are maintained at the following monuments: Aztec Ruins, Casa Grande, Chaco Canyon, Gran Quivira, Montezuma Castle, and Petrified Forest. The artifacts in these museums are, as a rule, not labeled. Instead, the custodian, assisted in some places during the heavy tourist season by temporary rangers or guides, shows the visitors through both the museum and ruins, explaining the various exhibits, and answering the questions asked by the visitor. We consider this method superior to labeling as in many cases the visitor desires specific information on certain exhibits which can only be furnished by a ranger or guide personally conducting the visitor.

In our museums only the most rare and valuable specimens are placed under glass. Most of them are displayed in the open on shelves and tables. In spite of this, the percentage of vandalism or stealing is so small as to be almost negligible. While the visitors are always accompanied by a ranger or guide, in many instances the parties are too large for anyone to keep on the lookout for possible "lifters." A museum of this type has added interest in containing exhibits excavated on the grounds in the immediate vicinity of the museum, as compared to museums where the exhibits are brought in from hundreds and thousands of miles away.

Additions are being made to the museum collections of the various monuments by donations of specimens or artifacts from private persons, and in all cases we have tried to get exhibits that fit in with the culture of the specimens already in the museum, or exhibits which are good for comparison with the others.

Under this head mention should be made of the visit of Park Service Photographer George A. Grant, who visited a number of the southwestern monuments, and took photographs that will be of value in the future both from an educational and publicity standpoint.

CAMPING FACILITIES AND SANITATION

A camping ground for tourists is maintained at many of the monuments. Tables are being installed, pits dug for garbage disposal, and toilets installed as funds permit. There are many things still needed to make the camping sites ideal, but we are gradually working toward more adequate accommodations for the camping tourist. This will continue to be a part of the program of expansion in the future, and its progress will be somewhat governed by the progress of other improvements.

REPAIRS OF RUINS, ROADS, AND TRAILS

Considerable repairs of ruins were made at the following monuments: Aztec Ruins, Chaco Canyon, Gran Quivira, Montezuma Castle, Pipe Spring, and Tumacacori. Some road grading has been done on the road leading to Capulin Mountain, making a material improvement which is reflected in the increased travel. Some work also has been done on the road leading to Gran Quivira from the north. Some improvement in the roads and trails of Natural Bridges is reported. The rainy season cuts down travel considerably, as the roads after a rainy spell, in many places, are almost impassable. Aztec Ruins, Chaco Canyon, El Morro, Gran Quivira, and Petrified Forest suffer the largest loss from this source.

PAGEANT AT CASA GRANDE

One of the most interesting features of the past year was the pageant given by the Arizona Pageantry Association at Casa Grande on Compound B on March, 8, 9, and 10. There was a total attendance in excess of 7,000 for the three days. The crowds were easily handled by our local force of rangers, and there was not even a minor accident of any kind. We have inaugurated a new system of handling the parking of the cars of a large crowd and the result was the clearing of the parking grounds in short order without a mishap. The association plans on continuing the pageant as an annual affair.

NEW CONSTRUCTION

During the year, besides some little repair work on some of the older buildings at Casa Grande there has been erected a ranger's residence of adobe brick with a roof of felt tar covered with asphalt and gravel, and a new custodian's residence at Chaco Canyon of stone. A ranger's residence is in the process of construction at Petrified Forest, and this will be shortly followed by a residence for the custodian. A residence for the custodian at Tumacacori is planned for the near future, as is an addition to the present quarters for the custodian at Montezuma Castle. The quarters at Casa Grande are the only ones built with funds of fiscal year 1928-29. The rest is construction work of the fiscal year 1929-30.

ADMINISTRATION

The 18 monuments designated as southwestern monuments cover a total area of over 60,000 acres and were administered during the past year by the superintendent, clerk-stenographer (until April 1, 1929), 7 full-time custodians (2 of which entered on duty during the year), 6 part-time custodians, 1 permanent ranger, 3 temporary rangers, 2 part-time guides, and a ranger-naturalist.

THE FUTURE AND ITS NEEDS

One of the problems confronting us in the near future will be the handling of crowds of visitors in the various ruins, many rooms of which are too small to accommodate more than a small number. This began to be a problem at Casa Grande during the heavy run of last winter. We will eventually have more adequate buildings for museums, and the conducting of visitors through these will not be much of a problem, but the rooms in the ruins must remain as they are as to size. We may have to revise our system of taking care of visitors on heavy days, at least at some of the monuments.

At Aztec Ruins the museum collection is housed in some of the old ruins and in some cases the artifacts are still in their original place. This makes an ideal way of displaying the exhibits if the room is large enough. The collection at Casa Grande is housed in two rooms in a building originally built for ranger's quarters, and the collection can not be properly displayed on account of lack of room. One of the immediate future plans at this monument is the construction of an administration building with several large rooms set aside to house the artifacts in proper cases. At Chaco Canyon, Gran Quivira, and Montezuma Castle the museum collections are housed in the various custodians' residences. Museum buildings or additions will have to be planned in the near future.

With increasing tourist traffic it will be necessary to enlarge parking grounds and provide larger and more convenient camping places. The increased number of people will also materially increase the problem of proper sanitation.

The water situation at some of the monuments is one of the things that will receive early attention. In fact, we are working toward a possible solution now. At Petrified Forest the water is being hauled in from a considerable distance, and if this is to continue, it will be necessary to provide a large tank truck for hauling and adequate storage facilities. The alternative would be the building of a catchment area of sufficient size with storage facilities, as there is practically no hope of getting good water by drilling. At Chaco Canyon the only water available is on private land and steps must be made either to secure the land or to drill a well on the Government holdings. At Casa Grande there is a 50-foot well, but as the water level is continually lowering and the well must be deepened every summer, it will be necessary eventually to drill a well of about 300 feet, a depth where excellent water is found in sufficient quantities.

Considerable fencing will have to be done at Petrified Forest to restrict the areas that can be entered by cars, and thus reduce the possibility of the removal of the petrified wood. In connection with the above problems valuable assistance has been furnished by Mr. Vint, Mr. Kittredge, and Mr. Edwards.

Another problem of the future will be the acquiring of some of the private holdings in Chaco Canyon and in Petrified Forest. This is taken up further in the individual monuments affected.

VISITORS BY MONUMENTS

Arches.....	500	Navajo (estimated).....	965
Aztec Ruins.....	18, 193	Papago Saguaro (estimated).....	87, 600
Capulin Mountain (estimated).....		Petrified Forest.....	69, 350
Casa Grande.....	12, 000	Pipe Spring (estimated).....	24, 883
Chaco Canyon (estimated).....	37, 244	Rainbow Bridge (estimated).....	450
El Morro (estimated).....	2, 750	Tumacacori (estimated).....	18, 250
Gran Quivira.....	2, 625	Wupatki (estimated).....	550
Hovenweep (estimated).....	3, 357	Yucca House (estimated).....	250
Montezuma Castle.....	450		
Natural Bridges (estimated).....	17, 824	Total.....	297, 501
	260		

CARLSBAD CAVE NATIONAL MONUMENT

THOMAS BOLES, Superintendent, Carlsbad, N. Mex.

GENERAL STATEMENT

Carlsbad Cave consists of a series of lofty, spacious chambers and connecting corridors, with alcoves extending off to the sides that are of remarkable beauty. The limestone decorations excel those in any known cavern. The most impressive portion is the Big Room, nearly 4,000 feet long with a maximum width of 625 feet. At one place the ceiling is 300 feet high. Here the formations are massive as well as magnificent.

Although the existence of the cave was known to neighboring ranchers for many years, the first explorations are credited to Jim White and a young Mexican. In 1923 Robert Holley, and later Dr. Willis T. Lee, both of the Interior Department, made inspections of the cavern, and their reports justified the creation of the monument by President Coolidge. Later Doctor Lee spent six months surveying and mapping the cavern at the direction of the National Geographic Society, his illustrated reports being published in the January, 1924, and September, 1925, issues of the magazine.

TRIPS

Although the cavern is known to extend for over 21 miles, the visitor at present is conducted over a 7-mile loop which covers many of the spectacular portions. Trail improvements during the past year make the underground trip much easier than before, and further changes will be made during the coming winter. The cavern is open to visitors every day in the year. The regular trip starts at 10:30 each morning and requires about 5 or 6 hours including 30 minutes for lunch. During the trip visitors are at all times under the guidance and control of uniformed national park rangers. Guide service is furnished at a cost of \$2 for each adult, with children free. Scoutmasters and teachers are availing themselves of this opportunity, and frequently 30 or 40 go through on one ticket.

VISITORS

During the 1929 season 76,822 visitors arrived in 24,552 automobiles, representing every State and many foreign countries. Nearly 90 per cent of our travel originates outside of New Mexico. Our big month was August with 27,791 visitors; our record day was September 1 with 1,680 visitors, who were handled through the cavern in three groups with such ease as to bring forth considerable favorable comment. The remarkable increase in travel can be attributed to our new lighting and improved trails.

PERSONNEL

During the fiscal year 1929 the superintendent in charge has been assisted in his office work by a part-time clerk, and all revenues and disbursements, amounting to nearly \$150,000, have been handled with this limited force. Nearly all the monument activities are incidental to maintaining the trails and stairways in the cavern, and the protection of the formations therein, and to the guiding of visitors. The protection force consists of a chief ranger and three permanent rangers, and several temporary guides during the summer months. People who appreciate the unusual conditions under which we operate have been very complimentary on the efficient handling of visitors during the rush season.

LOCAL DEVELOPMENT

Structural improvement during 1929 includes a 75,000-gallon reservoir on the north ridge; a 10,000-gallon storage tank for fuel oil; three stone guide-cabins; changing the old power house to a storeroom; and the public comfort stations adjoining the concession building.

Trail revisions designed by our engineering department enable the visitor to make the cave trip with but 60 per cent of the physical effort formerly required; the tunnel under the Devil's Hump not only saves a climb of 125 feet each way, but shortens the cave trip nearly 30 minutes. The short passage from the King's Palace to the Green Room opens up to the public a new chamber, and brings the visitor toward the surface over a newer, easier, and more interesting route.

Our new 120-horsepower Diesel motor enables us to light almost the entire cavern at one time; a similar unit will be added next winter.

Most important, however, was the new system of lighting installed throughout the Big Room by our Chief Electrician Emmert, ably assisted by Mr. William Oglesby whose valuable services were donated by the Westinghouse Co. The hundreds of floodlights artistically concealed have brought forth beauties hitherto unsuspected.

It was quite fitting that the first person shown through this Big Room by our new indirect lighting was Congressman Cramton, whose valuable aid obtained appropriations commensurate with the caverns needs. Mr. Cramton's enthusiastic expressions over the spectacular lighting effects have been re-echoed by our tens of thousands of visitors.

Additional floodlights were placed between the cave entrance and the Big Room, and lanterns are no longer used.

HOTELS AND CAMP GROUNDS

Since last season the capacity of hotels and tourist camps at Carlsbad has been doubled. As these can be reached by an hour's drive over good highways, there seems no necessity at present for establishing either hotels or camp grounds on the monument area, especially when we consider our limited water supply.

PUBLIC-UTILITY OPERATOR

The Cavern Supply Co., operating under their contract with the Interior Department, reports a very good season in their sale of lunches, photographs, and curios. Their stone building, built in pueblo style, fronting our parking terraces has made an excellent impression on our visitors, as has their service to the public. Lunches are also served inside the cavern at the new location selected by the Public Health Service.

HIGHWAYS

Nearly all cavern visitors arrive in their own cars, hence the development of tributary highways is most essential to the future patronage of the cave. State highway 18 ending at the cave, has been graveled for 3 miles from our parking terraces, and in addition to this there have been placed 4,000 feet of Hi-Way safety fence along the road coming up out of Walnut Canyon. Several highway associations have pledged their efforts for further improvement of tributary highways, not only in New Mexico and Texas, but also in Arizona and Oklahoma. Satisfactory progress is being made on the short highway between El Paso, Tex., and the Carlsbad Cave, and most of this will be open this winter.

FAUNA AND FLORA

The most interesting feature of our animal life is the colony of about 3,000,000 bats that live in the eastern portion of the cavern, emerging as a cloud each evening during the summer months. Many cave visitors remain to watch this fascinating phenomenon. Ground squirrels and quail are quite plentiful around the cave entrance. New Mexico cacti and other desert plants near by provide an excellent opportunity for our nature guide service. A State game preserve has been established around the monument.

WEATHER

The local weather ranges between zero in midwinter and 100° on many days in the summer, but owing to the low humidity even these temperatures are not severe. New Mexico's dry air is famous for its health-restoring qualities. The temperature inside the cavern is 56° all year.

LOCAL COOPERATION

In addition to the customary cooperation which the service has received from the Carlsbad Chamber of Commerce in its preparation and distribution of thousands of dollars' worth of effective publicity, this organization has also assumed the \$600 cost of paving and sidewalks in front of the lot donated by them last year as a site for the superintendent's residence in Carlsbad.

CONCLUSION -

The rapid increase in attendance at the Carlsbad Cave, and the widespread territory represented thereby, is sufficient evidence that the cavern has taken its place as an outstanding feature of the national park system. It is now, and will continue to be, self-sustaining; and our future appropriations, like those in the past, should be in keeping with the public demand for comfort and convenience in visiting this largest, most beautiful, and to-day the best lighted cavern in the world; and at the same time insure absolute protection to the millions of beautiful but delicate formations, which when once destroyed are gone forever. Especially important are the extension of the lighting system and of underground trails. The boundaries of the monument also should be extended.

CRATERS OF THE MOON NATIONAL MONUMENT

R. B. MOORE, Custodian, Arco, Idaho

Craters of the Moon National Monument is 23 miles west of Arco, Idaho, on the Idaho Central Highway between Arco and Hailey. It is reached by way of Blackfoot over the Lost River Highway from the West Yellowstone entrance to Yellowstone National Park and from the west by leaving United States Highway 30 at Mountainhome or Idaho State Highway 24 at Shoshone. The monument was visited in 1929 by 7,730 persons.

Its area was increased to 80 square miles in 1928 and comprises a vast field of peculiar lava flows, ice caves, extinct volcanic craters, and cinder beds strewn with volcanic bombs which have been erupted in a molten condition and dropped from great heights.

The loop trip of 6 miles through the better-known portion of the monument leads past the Big Crater, where a terrific volcanic explosion has rent a cavity in the top of a mountain a thousand feet deep and a quarter of a mile wide; the Crystal Pit, a volcanic aperture lined with sparkling stalactite formation 110 feet deep and 60 feet wide at the bottom but opening in a narrow outlet through which come strange air currents from underground; ice caves and water holes where water remains at a temperature of 2° above freezing exposed to the sun on the hottest days of summer; and other craters, caves, cinder beds, lava streams, and floats and interesting rock formation.

Road construction of 1929 completes a continuous gravel-surface road from Blackfoot to the monument.

MUIR WOODS NATIONAL MONUMENT

JOHN T. NEEDHAM, Custodian, Mill Valley, Calif.

During February and March an engineer from the San Francisco office was detailed to Muir Woods to topographically map the level parts of the grove. When completed the map will show buildings, bridges, trails, water mains, all large redwood trees, the streams, and the topography on a 2-foot contour interval. It will be most useful in connection with a future plan of development for this monument. At the same time data were taken on the stream from which plans and specifications for much-needed revetments will be drawn.

Much work which had long been deferred owing to lack of funds was done during the spring months on the Dipsea, Ben Johnson, and Ocean View

Trails. All parts of these trails within the monument are now in first-class condition. Routine patrols and operations necessary to keep the grounds clean were carried on as usual, and the park was kept free of litter at all times.

On May 5, 1929, a memorial, sponsored by the Tamalpais Conservation Club, was dedicated to the memory of the late William Kent, donor of the monument. It consists of a large boulder, to which is affixed a suitably inscribed bronze plaque and is located near the mouth of Fern Canyon.

During October, 1928, the last section of unimproved county road between Muir Woods and Mill Valley was graded and put in shape for automobile travel. It is a short stretch slightly over a mile in length located between the eastern terminus of the Muir Woods Toll Road and the Mill Valley town limits, and is a link in the Mill Valley-Stinson Beach Highway opened to travel at the same time. At the present writing another approach to Muir Woods is being completed in the form of a new county road, approximately 1 mile in length, connecting the old Bolinas Road with the above-mentioned terminus of the Muir Woods Toll Road. This cut-off will shorten the distance for automobiles from San Francisco over 2 miles and they will not have to pass through the narrow streets of Mill Valley.

There is much work to be done at Muir Woods if the necessary funds can be provided. It is of the utmost importance that revetments be constructed in the stream to prevent further loss of soil and fine redwood and bay trees during period of high water. The disastrous Mill Valley fire of July 2, 1929, evidenced the need of having some adequate fire-prevention equipment at this station. But for favorable winds Muir Woods might easily have been reached and seriously damaged by this fire.

It is important that more land be acquired by the Government adjacent to the south boundary of the monument for use as a parking ground and automobile camp. The only parking ground at present available is on private land.

Travel to Muir Woods for the year shows a slight decrease under the 1928 year caused by the general decrease in number of tourists visiting California this summer. Visitors to the monument from October 1, 1928, to September 30, 1929, inclusive, totaled 93,358. Of these, the Mount Tamalpais & Muir Woods Railway carried 15,044, the stages carried 4,596, 23,718 came in 7,306 private automobiles, and hikers were estimated to number 50,000.

PINNACLES NATIONAL MONUMENT

W. I. HAWKINS, Custodian, Hollister, Calif.

The county of San Benito, in which the Pinnacles are located, has budgeted \$30,000 for the purpose of buying and giving to the United States 2,080 acres of land needed to bring the monument out to natural boundaries.

The county now has options on 1,920 acres of this land, and the purchase now only awaits the clearing of the titles, which will be finished in the next few months. The balance, 160 acres, will be condemned.

During the year the rangers' cabin and the rest room have been completed with the exception of the rock facing. We have \$150 each allocated for this work and are waiting for fall, when we can get more effective labor.

Part of the trail to the high peaks was made during this year. Further funds should be allotted to put this trail well into the peaks.

REPORT OF CIVIL ENGINEERING DIVISION

FRANK A. KITTREDGE, Chief Engineer, San Francisco, Calif.

Gratifying success followed the suggestion of the director, as approved by the Secretary, that all civil engineering work be coordinated under the chief engineer by having the civil engineering division furnish nearly all engineering assistants except permanent resident engineers.

The engineers are selected with a great deal of care as to engineering experience, versatility, personality, tactfulness, and willingness to cooperate. They are also especially drilled in the proper perspective for Park Service construction. The results accomplished have been fully up to expectations, and close cooperation has been had with the superintendents under whom the various engineers have been placed administratively. The general satisfaction of the

plan is evidenced by increased responsibility which the superintendents voluntarily place upon the engineers furnished from this office and the numerous requests for additional engineering assistance. The trial of this plan during the early part of 1928, on a much smaller scale, evidenced its practicability, and this resulted in the authorization of increased engineering personnel which has greatly facilitated the construction activities, increased efficiency, and made possible the additional studies desired by the director and the Secretary for which no specific appropriation had been made.

The groundwork has been made for a comprehensive plan of ultimate development in the various national parks which has been so greatly needed. Enough data have been obtained this year to permit the completion of a general outline into which the building of park needs may be later fitted. This outline must necessarily be revised and added to each year, so that in its ultimate form it will be the basis of a future development for perhaps 10 or 20 years. The general program will be the joint study and plans of superintendents, landscape architects and engineers, and others interested, and should be of inestimable benefit not only as an aid to our thinking along comprehensive lines, but also to enable the Secretary, the Director of the Park Service, the Budget officials, and congressional committees to know our ultimate objective and to realize that we are working along systematic lines which will not require the abandonment or misuse of utilities for which funds have been or are to be appropriated.

Two fully equipped parties are now in the field making topographical surveys, which are of fundamental importance in planning for the proper use of ground in the layout of roads, buildings, landscaping, and the general utilization of the various areas. Much yet remains to be done in the preparation of topographical maps, but 31 maps have been prepared this year, including those most important from the standpoint of immediate use.

A special investigation was made of a possible system of interpark roads across Indian reservations lying in northern Arizona, southern Utah, southern Colorado, and New Mexico. This was made at the urgent request of the Secretary's office. These studies involve proposed routing, costs, and the necessity and practicability for roads which would connect Mesa Verde National Park with the various national monuments and Grand Canyon, Zion, and Bryce Canyon National Parks. Many hundreds of miles were investigated, from which the proposed four projects, comprising 572 miles of standard highway, were selected. These findings will be very valuable to the Secretary when Indian affairs and interpark roads are further considered.

An investigation of a possible scenic corridor and highway connecting Sequoia and General Grant National Parks was made by reconnaissance. This proposed highway is necessary as a northern outlet from Sequoia National Park and for the facilitation of the administration of the General Grant National Park, besides providing a link in the proposed Sequoia to Yosemite High Sierra road.

An investigation was made in the Kings River area in California to determine its suitability as a national-park area from scenic, recreational, and administrative viewpoints and to determine what effect, if any, proposed power development would have upon its value as a future national park.

Comprehensive study was made of road and trail development, administrative areas, public-utility and camp sites, and methods of protection in various national monuments which have heretofore been greatly neglected in so far as engineering studies and monument requirements are concerned. It was found that in a number of the national monuments extensive operations would be required to protect the prehistoric ruins from damage by the elements and from vandalism. This is particularly true with regard to Petrified Forest, Devils Tower, and Chaco Canyon.

Intensive engineering study has been made in dustless surfacing of trails and footpaths which have developed satisfactory methods of handling this problem. Actual statistics had developed the fact that the trails were going into great disuse, due to the intolerable, dusty condition.

Our engineers have, at the instance of the superintendents, been intensively employed in the location and survey of the more important trails in the major parks. These operations have resulted in a great saving to the Government in cost of construction, and in much better alignment, grades, and scenic values. They really involve the proper study and exchange of ideas before, rather than after, the trail is constructed.

During the period from October, 1927, to October, 1929, this division has entered into 141 contracts for the aggregate amount of \$345,000 for the pur-

chase of equipment and supplies for the various national parks. These purchases are in the nature of centralized purchase involving the preparation of definite specifications, the fullest competition in bidding, and the preparation of contracts and the making of payments all through this division. Some slight adverse criticism has been made in individual cases, but it is almost sufficient to say that only one temporary suspension has been made by the reviewing authorities of any contract entered into by this division. This is the direct result of careful preparation and justification of specifications as to the definite quality required after extensive research and comparison of all material or equipment of the class available, and insistence upon the article delivered being entirely in accordance with the specifications.

A great many standard specifications have been prepared and furnished to the parks for specialized equipment and supplies, the purchase of which was made directly by the park interested. The situation of San Francisco as a market center has made it possible to give great assistance to the western parks in emergency purchases, with proper competition, where time of delivery was a strong factor.

The past year has proved by the amount of work accomplished and the increased efficiency in prosecuting such work, that this division is a working organization in every sense of the word and is entitled to definite independent appropriations as such. Very little work can be classed as purely overhead.

REPORT OF LANDSCAPE ARCHITECTURAL DIVISION

THOMAS C. VINT, chief landscape architect, San Francisco, Calif.

GENERAL STATEMENT

The work of the landscape division is that of professional advisor to the service in matters pertaining to the field of landscape architecture. Its primary purpose is to obtain a logical, well-studied general development plan for each park, which includes a control of the location, type of architecture, planting, grading, etc., in connection with any construction project within the parks. It is concerned to a degree in all phases of park development. It administers no construction funds and does not assume direct charge of any construction work. Its work is accomplished by a review of plans. It prepares the architectural and landscape plans for the Government facilities constructed by the park superintendent and his organization. It reviews the plans submitted by the public-utility operators for the construction of tourist facilities. It reviews the plans for road projects and prepares the architectural plans for bridges constructed by the Bureau of Public Roads.

The year being reported was not one with outstanding high lights. There was a large volume of minor structures built by both the Government and the utility operators which required much time and study. There were no conspicuous building projects. The road program was of the usual volume of work, consisting largely of attention to projects under way. There were fewer new projects due to the limitation of funds for this purpose.

It was a year of catching up. We made progress within the organization for a more thorough and efficient method of handling the office work.

In the field we were able to cover our territory more thoroughly and to make trips to parks and monuments that have not heretofore been covered because of lack of time.

PERSONNEL

We have authority to employ 6 assistant landscape architects and 2 juniors. At present we have 3 assistants and 2 juniors under permanent appointments. Two of these were qualified during the year. We have been a year and a half trying to fill the other 3 places. The men we employed have difficulty in qualifying with the civil service, and the civil service has had difficulty in finding qualified eligibles. This situation has become a serious handicap, as we are unable to hold the best men under a temporary appointment because of the uncertainty of the length of time we can assure them of work.

The turnover of temporary employees has proved an expensive and inefficient procedure, as we find it takes about a year in the organization to get full value out of a man's time. This situation is mentioned in this report because it has lowered the efficiency of the division during the year to at least 30 per cent below what it should be.

OFFICE WORK

This work constitutes the preparation and review of plans for the current year's construction. It is largely a drafting-room job. All field men are brought into the San Francisco office for this work when not required in the field for supervision of construction. This procedure has proved very satisfactory, as the men are familiar with the purpose of all features of a plan when they follow it through its preparation and are thus able to better carry out the intent of the plans in the field.

Our office work is divided into two general classes. The first covers items within the regular park appropriations and the construction done by the operators or work done directly by the superintendent's organization. The other covers work done under the road appropriations or work done through the Bureau of Public Roads.

Building plans constitute the largest volume of our drafting-room work. During the current year plans for hospitals for Yosemite and Grand Canyon Parks were the outstanding ones. There was the usual volume of work, but it consisted of a long list of minor buildings, residences, utility structures, checking stations, etc. Administration buildings were completed during the year for Rainier and Grand Canyon. These are rather outstanding structures, and, we feel, successfully done. The plans for these were prepared during the previous year.

We made considerable, but by no means totally satisfactory, progress in the preparation of sketch plans for the 1931 construction season. The purpose of these is to furnish a definite plan to the park superintendent in order that he may estimate the cost of the structure required and submit the sketch plan with his estimate to the Budget when requesting funds for his park. This procedure should prove more satisfactory than the previous method of preparing the plan after the money becomes available. We succeeded in preparing sketch plans for about one-half of the parks this year. It was a considerable gain over former years, and we will endeavor to complete all the necessary sketches for the 32 estimates.

PUBLIC-UTILITY CONSTRUCTION

While there was no large hotel or lodge constructed during the past year, nearly every existing hotel or lodge had additions or enlargements to make. Many times an addition requires more of our time, as the plans are more frequently returned for a revision. This is because less time and thought is being given to it by the operator, the amount of money involved being small compared to that needed for new work. From a landscape viewpoint an addition may have an importance equal to that of the original project.

The growth in housekeeping camp facilities is probably the most conspicuous development of the year. Several new housekeeping camps were opened in different parks and existing camps were expanded. The growth in this type of facility has reduced the need of expanding the free-camping area to such a degree that in some parks all the increased travel was handled by the increased housekeeping facilities without adding to the free-camping area.

BUREAU OF PUBLIC ROADS

Our work with the Bureau of Public Roads, while this was not a year of great volume because of the limited funds for new work, was distinctly progressive. We have been handicapped in previous year with a limited personnel in the division. Our method was to meet the problems at hand and get the work through the office by forced effort rather than system. The volume of road-project plans grew faster than we did. Besides we are probably the only office to do landscape work in connection with large road projects in the western mountains, and we are doing this work through another organization. We had much to learn about the work and about the Bureau of Public Roads. The bureau likewise had to learn about our work and about us. Because of all of these things, the first few seasons it was necessary for us to feel our way.

This year we were able to catch up and take time to work out a system for handling each project. We can tell in a moment what the status of any project is. Heretofore we depended upon the correspondence file, our memories, and reminders from the bureau or a park superintendent that certain plans were waiting. We now keep a diary of each project, and every point is

checked in the diary before any plans or correspondence is filed. It has proved a tremendous timesaver and has avoided our overlooking or delaying a point.

We made a general revision of the specifications covering the landscaping features. Heretofore a specification was made for each project. This year we made a standard specification covering such points that are common to every job. Supplementing this, we made a check list of points that are special to particular types of work. We feel that we have this phase of the work properly organized so that a specification can be checked much more rapidly and with reasonable certainty that no point has been overlooked.

The most important change in specifications for road construction was the introduction of what we call "Type B" excavation. This provides for the careful handling of rock excavation for the purpose of avoiding damage to outstanding natural features. It is logical that in a national park the same protection from blasting should be given some natural feature that can not be replaced as in cities is given to buildings. This type of work is more expensive and is required only at special points. It was introduced on four new projects this year, and the prices obtained were not in excess of the engineers' estimates. To date actual construction according to this specification has not progressed sufficiently to report the results.

The bureau made a change in handling bridge plans which has proved to be an outstanding advantage to us on this work. All bridge plans are prepared in the regional office at San Francisco instead of in the office of each district engineer. This enables us to work with the bureau bridge engineers throughout the development of the plans. Heretofore the plans were checked by us when they came to the regional office for checking. This gave but two opportunities—one in the sketch stage and one when the final plans came in.

Last year we established the procedure of incorporating architectural sheets prepared by our office in the working plans of all bridge projects. This has resulted in a more satisfactory carrying out of the architectural features of this work. The change to preparing the engineering plans at the San Francisco office of the bureau has made it possible to collaborate our efforts with theirs throughout the process of preparing the plans.

TRAVEL AND FIELD WORK

With the exception of the southern or all-year parks, our field work is done during the summer construction season, or from May or June to October or November. Assistant and junior landscape architects are assigned to a park, or two or three adjacent parks, to cover our work in a given territory. I endeavor to make one or two trips a year to each park having an active construction program. Having men to cover a district enables us more adequately and more thoroughly to cover the work. They are available to interpret the intent of the plans and make decisions as the work progresses without delay to the construction forces.

This year we were able to assign men to the field that have been with the organization at least a year. This is important, as we have succeeded in making good landscape men out of our park superintendents and the project engineers of the Bureau of Public Roads. Under this condition a well-trained landscape architect entering national park work, deals with men who are more familiar with his particular problems than he is himself. It takes at least a year to make a national park man out of the best of new men, as it is a specialized work. Although we are somewhat short-handed because the civil service has had difficulty in qualifying men for the work, we are making it a policy to send only men who have been with the office a season before giving them a field assignment.

Field assignments this year:

1. Glacier and Rainier.
2. Crater, Lassen, Yosemite.
3. Yellowstone, Southwestern Monuments.
4. Zion, Bryce Canyon, Grand Canyon.
5. Rocky Mountain, Platt, Mesa Verde, Sequoia.

Besides being a little better equipped to handle our general run of field work, I was able to take advantage of the quiet year and visit parks that we have heretofore left out of our field work. Hot Springs, Platt, Wind Cave, and the Southwestern Monuments were covered by field trips. No one now in the landscape organization had covered the parks before. Whereas the problems are not large in these, they are far-reaching in that what work is done now influences the work that is to be done many years hence.

This report is being written en route to McKinley Park in Alaska. This is the first time any landscape man in the service has covered that park.

I feel that our year in the field has been a successful one. We were able to cover parks and monuments that had been neglected heretofore and at the same time adequately handle the work within the parks that we have been covering. If our personnel troubles can be adjusted during the next few months we will be able properly to cover the enlarged field in the future.

LANDSCAPE PROJECTS

The following is a list of drawings and list of road projects under study by the landscape division in each of the parks:

GENERAL

Working drawings.—Typical log residence; standard symbols for drawings; standard designs for lookout towers (five complete sets); standard comfort stations (two sets); road signs; typical building details.

Road projects reviewed.—Base specifications for roads; standard head walls for culverts.

ACADIA

Building sketches.—Equipment shed.

Drawings reviewed.—Kane Memorial Bridge.

BRYCE CANYON

Sketches.—Ranger residence; barn and corral; equipment shelter; warehouse; superintendent's cottage.

Working drawings.—Ranger residence; standard comfort station; checking kiosk; trail stairway.

Drawings reviewed.—Extension to power plant; de luxe cabins.

CARLSBAD CAVE NATIONAL MONUMENT

Sketches.—Administration building.

Working drawings.—Enlargement of ticket office; garage.

CRATER LAKE

Sketches.—Kiser studio; administration building; curb dock and float; bunk house and dining room; rim ranger station; rim area layout; headquarters area layout; rim planting layout.

Working drawings.—General store and cafeteria; rock railings; administration building; oil station; guard rail; bunk house and dining room; Anna Springs ranger station; employees' cabins; winter comfort station; checking kiosk.

Drawings reviewed.—Victor rock railing; septic tank and sewage-disposal plant; ranger cabin.

Road projects reviewed.—East Entrance, Lost Creek; project 5-A; Anna Springs rim, routes 3 and 4.

GLACIER

Sketches.—Swiftcurrent Bridge; Avalanche Creek layout; checking station residence United States commissioner; planting plan, Belton residence No. 2 Swiftcurrent Gorge development; Many Glacier layout; Sun Camp layout overhead trail crossing; dormitory, Robb customhouse; customhouse; natural guide residence; story-and-a-half residence; 1-story residence; equipment shed road-maintenance buildings; Fielding ranger station.

Working drawings.—Oil house; Swiftcurrent Bridge; checking station; residence, chief mechanic; porch, chief clerk's house; snowshoe cabin; comfort station; residence United States commissioner; barn for ranger station; hikers shelter cabins; water-gaging station.

Drawings reviewed.—Alterations at Sun Camp.

Road projects reviewed.—Trans-Mountain Highway, project 1-C; Two Medicine Road, project 2-B; Babb-Many Glacier Road, Route No. 3.

GRAND CANYON

Sketches.—Residence, south rim; ranger station; American Legion hall; checking stations; comfort station; residence; barn; caretaker's cabin; machine storage shed.

Working drawings.—Comfort station, north rim; residence, south rim; equipment shed; hospital; parking area, Cape Royal; addition to superintendent's residence; laborer's cabin; oil house.

Drawings reviewed.—Gasoline storage station; cabins, Phantom Ranch; gasoline-loading racks layout; water-tank layout; cottage layout, village; generator house; cabins, north rim; comfort station, north rim; iron fence; location for auto camps; power line; male-help dormitory; head house; housekeeping camp; 4-room de luxe cabin; fireplaces; tenthouses; auto cabins; Phantom Ranch comfort station; incinerator.

Road projects reviewed.—Grand Canyon, Desert View, Route No. 1; Grand Canyon, south entrance, Route No. 2; Bright Angel, Cape Royal, Route No. 3; North entrance, Route No. 4; Grand Canyon, National Old Trails, Arizona, Route No. 2.

HAWAII

Sketches.—Ranger cottage, volcano entrance checking station.

Working drawings.—Ranger cottage; volcano entrance checking station.

Drawings reviewed.—Ranger cottage; park headquarters map; volcano house alterations.

HOT SPRING

Drawings reviewed.—Additions to Superior bathhouse; addition to Imperial bathhouse.

LASSEN VOLCANIC

Sketches.—Employee's cottage; bunk house and mess; lookout, White Mountain.

Working drawings.—Employee's cottage; bunk house and mess; machine shop.

Road projects reviewed.—Loop, Route No. 1.

MESA VERDE

Working drawings.—Road-maintenance buildings; stables.

Road projects reviewed.—North and south highway, Route No. 1.

MCKINLEY

Sketches.—Headquarters building, Sable Pass camp.

Working drawings.—Dog kennels and corral fence; power house; labor cabin; superintendent's residence; ranger's station, Copper Mountain; relief cabin; dog-feed cache; shed storage and cookhouse; machine shop; headquarters building; Sable Pass camp.

Drawings reviewed.—Water-storage tank.

MOUNT RAINIER

Sketches.—Community house; 4-room house; Longmire Plaza; Yakima Park development (eight schemes); checking station; outbuildings, White River entrance layout (three schemes); South Puyallup River bridge; St. Andrews Creek bridge; Indian Henry trail camp site; Klickitat Creek bridge, Frying Pan bridge.

Working drawings.—Map of Longmire area; map of Narada Falls area; 4-room house; warehouse; map of Paradise area; culvert stonework; stables; White River entrance station; Dry Creek bridge; landscape plan for administration building; Cowlitz Canyon trail bridge.

Drawings reviewed.—Gasoline station.

Road projects reviewed.—Nisqually Road, project No. 1-B; west side highway, Route No. 2; White River (Yakima Park) highway, Route No. 3.

NATIONAL MONUMENTS

Sketches.—Petrified Forest, employees' quarters; Tumacacori, custodian's quarters; Chaco Canyon, custodian's house; Petrified Forest, general plan; Aztec Ruins, custodian's residence and comfort station and tool and workroom; Casa Grande, superintendent's residence; Gran Quivira, custodian's residence; Montezuma Castle, tool and implement shed; Petrified Forest, ranger's quarters; Tumacacori, tool shed and wash room.

Working drawings.—Casa Grande, ranger's residence; Montezuma, addition to custodian's residence; administration area map.

PLATT

Sketches.—Pavilion for Black Sulphur Springs (three schemes); tool shop.
Working drawings.—Pavilion for Black Sulphur Springs; tool shop.

ROCKY MOUNTAIN

Sketches.—Warehouse; employee's residence; Onahu Creek bridge.
Working drawings.—Employees' cottages (two buildings); wash-room building; road camp stable; Bear Lake Road checking station.
Drawings reviewed.—Storehouse for Boulder Field.
Road projects reviewed.—Trail Ridge, west side, projects Nos. 1-B and C; Bear Lake Road, project No. 2-B.

SEQUOIA

Sketches.—Wolverton Creek culvert; maintenance shop; employees' quarters community building.
Working drawings.—Employees' cottage; garage; assistant superintendent's residence; chlorination building; Marble Fork Bridge; planting plan for Sherman Tree; Lodgepole Bridge; Clover Creek Bridge.
Drawings reviewed. Eddy studio; Ash Mountain sewage-disposal plant.
Road projects reviewed.—Park entrance, Alder Creek; project No. 1-A-1; Sherman Tree, Lodgepole, No. 1-C-2; Lodgepole, north park boundary, project No. 1-D.

WIND CAVE

Sketches.—Headquarters layout; public-utility buildings.
Roads reviewed.—North and south highway, project No. 1-A-1.

YELLOWSTONE

Sketches.—Snake River station layout; Old Faithful layout; barn for Silver Tip Ranch; Mammoth plan; Gardiner entrance revision, trail side map shelter.
Working drawings.—Rearing Pond; gaging station; map of Paint Pot area; map of Buffalo Ranch; Buffalo Ranch bunk house; revision to Lake bunk house; Hamilton's store.
Drawings reviewed.—Porch for Whittaker's store; Haynes' picture shop at Mammoth; Haynes' motion-picture theater; tailor shop, Mammoth; laundry building, Lake; housekeeping headquarters, Old Faithful; cafeteria and housekeeper's headquarters, Canyon; sewage-disposal plant at Fishing Bridge; parlor; curio shop; Old Faithful museum; Madison Junction, trail side museum; Yellowstone Park Transportation Co.'s bunk house at Lake and West Yellowstone; addition to Canyon garage; addition to hotel boiler room at Old Faithful; linen rooms at Canyon Lodge and Old Faithful Lodge.
Road projects reviewed.—Gibbon Canyon, project Nos. 1-B-1 and 2; east entrance road, Route No. 5; West Gallatin Road, projects Nos. 6-A and B; Canyon Junction, Tower Junction, project No. 1-G; Artist Point, project No. 9-B.

YOSEMITE

Sketches.—Museum layout; development, Camp No. 15; winter picnic grounds; women's dormitory; Glacier Point barn and ranger station; Glacier Point plan; Vernal Falls Bridge alterations.
Working drawings.—Footbridges; teacher's residence; pump house; Camp Curry parking area; Yosemite hospital; remodeling superintendent's house; women's dormitory; Glacier Point barn and ranger station; employees' cottage.
Drawings reviewed.—Ahwahnee group employees' cottages; Camp Curry buildings; bungalow apartments; cottage apartments; deer guard and bridle path at the Ahwahnee; water-supply plans; Sierra trail sign; toilet unit for Little Yosemite.
Road projects reviewed.—Happy Isles Bridge, project No. 1-B-2; Wawona Road, project No. 2-A; Big Oak Flat Road; Mather, White Wolf, project No. 6-B.

ZION

Sketches.—Virgin River bridge; superintendent's house; barn and corral; general layout, park headquarters; lodge area layout; employees' residence; trail shelter.

Working drawings.—Pine Creek bridge; Virgin River Bridge; masonry arch culverts; superintendent's house; checking station; parking area, Zion Lodge; parking area, Temple of Sinewawa; museum area layout.

Drawings reviewed.—Chemical-cart house.

Road projects reviewed.—Zion-Mount Carmel Road.

REPORT OF EDUCATIONAL DIVISION

ANSEL F. HALL, Chief Naturalist, Berkeley, Calif.

The year ended September 30, 1929, has been marked by a continuation of active interest and assistance on the part of many organizations and individuals cooperating in planning for carrying out of the educational program in national parks. The broad survey of educational possibilities of national parks, which was started during the field season of 1928, under a grant made available by the Laura Spelman Rockefeller Memorial, was continued during the field season of 1929. The informal committee of five eminent scientists who conducted the survey during the field season was enlarged to seven members. The membership at present is as follows: Drs. John C. Merriam, Hermon C. Bumpus, Vernon Kellogg, Frank R. Oastler, Clark Wissler, W. W. Atwood, Isaiah Bowman, and Harold C. Bryant, with Dr. W. J. Cooper, Commissioner of Education, acting as member ex officio.

Upon the recommendation of this informal committee the Secretary of the Interior appointed an informal advisory group to assist the Director of the National Park Service on matters pertinent to educational policy and development in the national parks. Doctor Merriam accepted the chairmanship of the advisory group, and Doctors Bumpus, Kellogg, Oastler, Wissler, Atwood, and Bowman accepted appointment as members.

PERSONNEL OF THE EDUCATIONAL DIVISION

During the past year there have been many additions to and changes in personnel of the educational division. Three new officers were added to the staff of educational headquarters. Carl P. Russell was promoted from the position of park naturalist in Yosemite National Park to that of field naturalist and was assigned to the specialized field of museum planning. George A. Grant was appointed photographer for the educational division. Dr. Harvey E. Stork served as assistant to the chief naturalist in the field during the summer season of 1929.

In Mount Rainier National Park, C. Frank Brockman was chosen to fill the vacancy left by the resignation of Park Naturalist Floyd W. Schmoie. The regrettable death of Glen E. Sturdevant at Grand Canyon during the winter of 1928 made it necessary to appoint a new park naturalist for that park; Edwin D. McKee now fills this position. Bert Harwell entered on duty as park naturalist of Yosemite National Park July 1, 1929, filling the vacancy created by the promotion of Mr. Russell. Harold E. Perry was appointed assistant park naturalist, probational, for Yosemite National Park on July 1, 1929. In Sequoia National Park the new position of park naturalist is temporarily filled by Acting Park Naturalist Frank T. Been. The position of park naturalist was created in Glacier National Park and this has been filled by Dr. George C. Ruhle. In Yellowstone National Park the new position of assistant park naturalist is temporarily filled by Newell B. Joyner.

TRAINING OF PERSONNEL

During the winter of 1928-29 the park naturalists of Yosemite, Mount Rainier, Glacier, and Grand Canyon National Parks were assigned to temporary service at educational headquarters in Berkeley, to work upon administrative plans for the current operation of the educational activities in their individual parks and upon scientific data needed for the use of their local staffs. The chief naturalist wishes to point out the special effectiveness of the planning work accomplished by these men at educational headquarters and recommends similar assignments in the future for the efficient formulation of plans and training of individual staff members.

PLANNING ACTIVITIES OF THE EDUCATIONAL DIVISION

During the past year much time has been devoted to the careful preparation of written plans for the administration of all activities being conducted under the educational division. A "General Plan of Administration for the Educational Division," setting forth the principles of organization and operation of this division, was completed at educational headquarters during the winter of 1928-29 and was reviewed by the Washington office and approved by the director on June 4, 1929. This plan states the general principles of administration of the division as a whole.

The above plan is supplemented by individual plans of administration of the educational activities for each national park. The latter detailed plans are prepared by the park naturalist, park superintendent, and the chief naturalist working in cooperation. Much time has been devoted during the past year to the preparation of these individual administrative plans for the educational units in the various parks, and such plans have been drafted for Yosemite, Glacier, Grand Canyon, Crater Lake, and Mount Rainier National Parks. These were concurred in by the superintendents, recommended by the chief naturalist, and approved by the director, as are the plans of other technical divisions.

INCREASED CURRENT SERVICE TO THE PUBLIC

In all of the national parks in which lectures, field trips, and other educational activities are offered to the public, an increasing demand has been shown on the part of the public for such service. During the year 4,096 lectures were delivered in the parks to a total of 558,656 visitors, and the 4,044 conducted field trips were attended by 138,273 persons. The few park museums now in operation were visited during the year by 505,644 persons. Thousands of other visitors used the nature trails, self-guiding trails, lookout stations, and other features of educational value. A detailed summary of the current service rendered in individual parks during the past year is appended in tabular form to this report.

During the past year there has been a remarkable increase in current educational service to the public—an increase oftentimes effected without material additions to the already overworked staff. Such new activities are especially to be commended in Yosemite National Park, where some of the new projects are the daily lectures being offered in two of the large public camps at the Mariposa Grove of Big Trees, at Hetch Hetchy, at Tuolumne Meadows, at Aspen Valley, and at several other outposts. Also, a new branch museum was put into operation at the Mariposa Grove of Big Trees and temporary exhibits installed at Tuolumne Meadows.

The new museum at Old Faithful in Yellowstone National Park was successful beyond all expectations during the first season of its operation, and is proving to be one of the major educational features of the park. Illustrated lectures are offered nightly in the court of this museum and are regularly attended by audiences as large as 1,500 persons. During the summer of 1929 construction has been pushed on another smaller branch museum at Norris Geyser Basin. Trail-side exhibits, lookouts, and other branch museums are being planned for other points throughout the park, each being a unit of the educational development being carried out in Yellowstone with the assistance of funds provided by the Laura Spelman Rockefeller Memorial, administered by representatives of the American Association of Museums in cooperation with the National Park Service. Field Naturalist Carl P. Russell devoted the summer of 1929 to planning of the exhibits and lay-out of these new branch museums.

Many new nature trails and self-guiding trails were established in the parks during the season of 1929, particularly in Grand Canyon, Zion, Sequoia, Yosemite, Crater Lake, and Mount Rainier National Parks.

Wild-flower gardens were also established and labeled at Sequoia, Yosemite, and Crater Lake National Parks.

In Mount Rainier National Park two experimental rustic trail centers were constructed near Paradise. These proved to be exceedingly effective and were immediately widely used by the public.

A series of three popular scientific lectures on The Past, Present, and Future of the Giant Sequoias was offered during July, 1929, at Giant Forest in Sequoia National Park, under the auspices of the Carnegie Institution of Washington. Dr. Ralph W. Chaney, internationally known paleobotanist, delivered lectures and it is sincerely hoped that similar addresses can be offered annually.

NEW EDUCATIONAL FIELD PROJECTS

While in the field the chief naturalist is engaged chiefly in planning and other administrative activities in cooperation with the park superintendents and park naturalists. He had found it difficult in past years to devote sufficient time to the detailed work of the establishment of new educational projects in the individual parks. During the season of 1929, however, such detailed work was made possible by the temporary appointment of Dr. Harvey E. Stork as field assistant to the chief naturalist, under whose direction he planned and carried out the following activities with the assistance of much contributed volunteer help:

In Grand Canyon National Park weather-proof metal labels were prepared and placed along the trail from El Tovar Hotel to Yavapai Point Lookout, a distance of 1.3 miles along the south rim. A series of metal labels was also prepared for use in connection with the establishment of a new nature trail at north rim.

In Zion National Park two new nature trails, one to Weeping Rock and the other to Mineral Pool, were planned in cooperation with Park Naturalist Woodbury and metal signs were prepared. Also, Doctor Stork and his volunteer assistants restored one unit of a cliff dwelling which stands beneath the "Giant Arch" in Zion Canyon. The building reconstructed was a granary, the walls of which were still standing to a height of about 2 feet. Rock masonry, plastered with mud, was carried up to the original height and the roof arched with a dome of flat stones plastered with clay. It is recommended that the remaining units of this group of cliff dwelling be restored, as we have in the vicinity examples of the type of structure which once stood there, and these would make an exceedingly attractive archeological exhibit.

In Sequoia National Park a wild-flower garden was established at Giant Forest in an area approximately 40 by 60 feet, adjacent to the museum and administration building. About 70 species of wild flowers were transplanted and labeled with metal signs, many of the specimens being carried from Alta Peak and other timberline habitats many miles distant, while others were brought up from lower elevations.

In Yosemite a wild-flower garden was established in the area surrounding the Glacier Point Lookout, essentially as planned in cooperation with the landscape division four years ago when the lookout was constructed. All species planted were labeled with informative metal tags. Similar metal labels were prepared for use along the 11-mile trail to Glacier Point and the 4-mile trail to Glacier Point as an experiment to determine the value of such labels along the regularly used trails. These labels not only contain data on the plants, flowers, geological features, etc., but also give distances and indicate the most interesting scenic features to be seen at each outlook point.

In Crater Lake National Park metal labels were prepared for the experimental labeling of a natural wild-flower garden near the present headquarters, which has been designated Castle Crest Garden. The labels are inconspicuously placed and during the season of 1930 a careful study will be made to determine their relative advantages and disadvantages. A well-labeled nature trail was established along the rim of Crater Lake from the hotel to a new lookout point about 1.3 miles westward. A temporary view finder was prepared for the latter point, which forms an objective for this interesting trip.

In Mount Rainier National Park more than 600 metal labels were prepared for use on 6 nature trails which were laid out at Paradise and Longmire.

PUBLICATIONS DURING THE PAST YEAR

The publication of Nature Notes was continued in Yosemite, Crater Lake, Mount Rainier, Yellowstone, Rocky Mountain, and Grand Canyon National Parks and a similar publication was started by Doctor Ruhle at Glacier National Park.

As an experiment, a number of mimeographed leaflets containing information on the geology, wild life, and other phases of natural history were prepared by Acting Park Naturalist Homuth at Crater Lake National Park. These were placed at Victor Rock and other points widely visited by the public and were most enthusiastically received by park visitors. Similar leaflets are being prepared for use in Yosemite, Yellowstone, and other national parks.

Much progress can be reported in the matter of information manuals for the national parks. General summaries were prepared for each of the subjects planned for the Yosemite Informal Manual. This was mimeographed and bound with copies of the Plan of Administration of the Educational Activities of

Yosemite National Park and the new Manual of Instruction for Educational Workers in that park. The work of Park Naturalist Homuth, of Crater Lake National Park, in compiling an extensive Information Manual for Crater Lake, in his own personal time, during the winter of 1928-29, is to be especially commended. Much progress has also been made on the Mount Rainier Manual of Information by Park Naturalist C. Frank Brockman, and upon the information manuals for Glacier National Park and Grand Canyon National Park. Another volume of the Ranger Naturalist Manual for Yellowstone was produced by the educational staff of that park.

LIBRARIES FOR THE NATIONAL PARKS

There is still a very urgent need for the establishment of libraries, especially for use by members of the educational staffs in the various national parks, and also for reference of visitors specially interested in particular phases of natural history. During the year many items were added to the Yosemite library as contributions from the Yosemite Natural History Association. Also, the small library in Yellowstone National Park was much enlarged by the addition of books obtained from Government surplus. Little progress can be reported in the other parks, however, chiefly on account of the lack of funds available for this purpose. At educational headquarters much progress was made toward the compilation of a bibliography of books on all national parks. This was accomplished through the volunteer assistance of Dr. William C. Bebb during the winter of 1928.

RESEARCH

There is a vital need in all of the national parks for accurate and detailed scientific facts upon which the educational program can be based. Also these facts are exceedingly important to the proper administration and interpretation of wild life and other distinctive features of the National Park Service. Scientific investigations were carried on in a number of the parks during the past year, but it is strongly urged that this research program be augmented by additional investigations as soon as practicable.

In Yellowstone National Park the geophysical laboratory of the Carnegie Institution continued the detailed scientific investigation of the thermal phenomena of that region under the auspices of Dr. Arthur L. Day.

The Museum of Vertebrate Zoology of the University of California continued a survey of the animal life of Lassen Volcanic National Park under the direction of Dr. Joseph Grinnell. It is understood that at least two more years of field work are necessary before a monograph similar to that on the fauna of Yosemite will be published by the University of California.

Through the generosity of a friend of the national parks a detailed survey of the Yellowstone elk herd and the life habits of the Yellowstone elk was conducted during the winter of 1928 and the summer of 1929. The data being secured will be exceedingly valuable in governing the plan for the management of the big game herds of that park and will also be of great interest in making available much additional data for the use of our educational staff.

Another friend of the national parks, George Wright, has at his own expense inaugurated a comprehensive survey of the wild life of all national parks, and has employed Joseph Dixon, formerly of the California Museum of Vertebrate Zoology, to direct this survey, which it is estimated will occupy approximately two years of field work and study.

WILDERNESS RESEARCH RESERVES

The chief naturalist is cooperating with the Forest Service, the California Forest Experiment Station, and the University of California, Division of Forestry, in planning investigations looking toward the setting aside of wilderness research reserves in the national parks of California similar to the reserve established several years ago in Yosemite National Park. Also plans are being made in cooperation with the Northwest Experiment Station at Portland, Oreg., for the establishment of similar research reserves in Crater Lake National Park, and other parks in the Northwest.

LAND CLASSIFICATION SURVEY OF THE NATIONAL PARKS

During the past year the educational division has cooperated with the California Forest Experiment Station in a forest type survey of the State of California, and forest type maps have been prepared for Yosemite and Sequoia National Parks, the field work being accomplished by the local park staffs. Similar land classification maps are now being prepared for all of the national parks. These are not only exceedingly important scientifically but are vitally needed in forest fire-control activities.

PHOTOGRAPHIC ACTIVITIES STARTED IN THE PARKS

Dr. Frank R. Oastler secured a grant of \$1,000 through the American Association of Museums for the preparation of lantern slides to be used in educational activities in Yellowstone National Park. These are being prepared under Doctor Oastler's personal supervision.

So important is the establishment of a photographic department in connection with the educational division that the matter was laid before a friend of the national parks by the chief naturalist, and sufficient funds were secured to establish a photographic department and provide for its operation to July 1, 1930. George A. Grant was appointed as photographer for the educational division, funds being contributed to the Park Service for this purpose. By request of the donor, the fund contributed for the purchase of photographic equipment and supplies is being administered by the trustees of the Yosemite National History Association, contributions being made to the Park Service as needed. Photographer Grant devoted the summer season of 1929 to field work in the Southwest, making hundreds of negatives in Grand Canyon, Mesa Verde, Bryce Canyon, Zion, and Sequoia National Parks and in the Southwestern National Monuments.

Summary of current educational activities in the national parks for the year ended September 30, 1929

National park	Field trips		Lectures		Museum attendance	Total persons served	Visitors during period
	Number	Attendance	Number	Attendance			
Crater Lake.....	53	1,277	94	11,235	10,055	22,567	128,435
Glacier.....	361	4,980	194	13,459		18,439	70,742
Grand Canyon.....	110	1,500	500	33,000	30,500	65,000	184,093
Hawaii.....	540	18,000	300	11,000	15,000	44,000	109,857
Mount Rainier.....	176	4,171	117	24,895	28,516	57,582	217,783
Rocky Mountain.....	40	1,300	55	5,000	1,500	7,800	127,408
Sequoia and General Grant.....	154	3,872	266	43,692	10,700	58,264	156,168
Yellowstone.....	1,385	84,611	1,155	291,125	166,480	542,216	260,697
Yosemite.....	1,088	14,322	1,103	112,900	234,325	361,547	461,257
Zion.....	137	4,240	312	12,350	8,568	25,158	33,383
Total.....	4,044	138,273	4,096	558,656	505,644	1,202,573	1,896,824

Total number of persons counted on all field trips.....	138,273
Total number of persons counted at all lectures.....	558,656
Total number of persons counted at all museums.....	505,644
Grand total.....	1,202,573

¹ Estimated.

REPORT OF FORESTRY DIVISION

ANSEL F. HALL, Chief Forester, Berkeley, Calif. JOHN D. COFFMAN, Fire Control Expert

The work of the forestry division, which is associated with the educational division, is devoted chiefly to the protection of park forests against fire, insects, tree diseases, and other injury. The appointment of John D. Coffman as fire-control expert has resulted in great strides being made in the organization of our fire-protection forces in the national parks, and his accomplishments in this field should be specially mentioned.

FORESTRY POLICY

During the winter of 1928 a forestry policy was codified by the chief forester. After being studied and revised by the director, it was approved and now forms the basis for forestry activities in the national parks.

FIRE PLANS

During the past year a detailed survey has been made of the fire hazard in Glacier, Sequoia, Yosemite, Lassen Volcanic, Crater Lake, and Mount Rainier National Parks, and Muir Woods and Pinnacles National Monuments. Based upon the detailed reports prepared by the fire-control expert, comprehensive plans have been made for the prevention and suppression of forest fires in these areas. These were approved by the director, and the plans for Glacier, Sequoia, Yosemite, and Lassen Volcanic National Parks were put into effect during the fire season of 1929, resulting in greatly increased efficiency and economy in fire control.

A condensed analysis of our forest-fire situation in the national parks during the season of 1928 is appended to this report. Owing to the fact that the present annual report must be submitted before the close of the fire season, it is impossible at this time to include a similar report for the season of 1929.

During the past year forestry headquarters has offered assistance to the park superintendents in the preparation of estimates for fire control and has acted as a clearing house for the cooperative purchase of equipment, tools, etc. The cooperation received from the Forest Service in the matter of purchases has greatly reduced expenditures in many items.

Forestry headquarters, through Fire Control Expert Coffman, assisted in training rangers and other local personnel, in fire-control methods in Sequoia, Yosemite, Glacier, and Mount Rainier National Parks.

During the past year a fire code for national park buildings was produced at forestry headquarters in cooperation with the Forest Service and the National Board of Fire Underwriters, and submitted to the director for approval through the landscape architectural division.

INSECT CONTROL

Forestry headquarters acts as a clearing house for the reporting of insect infestations in the national parks, and during the past year has been in constant touch with the Bureau of Entomology. The heartiest cooperation has been received from the latter organization. Field investigations to determine the seriousness of insect infestations are conducted under their auspices and actual control measures, although carried out under Park Service administration, were planned and supervised by them.

An especially severe attack by the mountain pine beetle in Crater Lake National Park made it necessary to transfer funds from practically all of the other parks where money had been allotted for insect control, and all these funds were devoted to the stamping out of this exceedingly bad outbreak. Due to the fact that such infestations flare up without previous warning, it is sincerely hoped that, in the future, appropriations for insect control can be set aside in a lump sum so as to provide for the utilization of these funds in the parks where they are most needed.

TREE DISEASES

The most important tree disease threatening the forests of the national parks is the white pine blister rust. An intensive survey of the situation in Acadia National Park was made by the blister rust control, and careful plans were made for the eradication of Ribes.

The office of blister rust control of the Bureau of Plant Industry also cooperated with the Park Service to the extent of a careful field examination in Mount Rainier, Crater Lake, and Glacier National Parks. Requests for appropriations for the control of this tree disease will be based upon these careful field surveys.

Forest fire statistics, calendar year 1928

[M. B. F. = Thousand board feet. Figures on timber destroyed are estimates and not actual cruises]

Park	Classification of fires				Location of origin of fires			Area burned inside parks				Timber destroyed inside parks			Costs of fire suppression							
	Inside parks				Outside parks			Timber	Brush	Other	Total	Gov-ern-ment	Pri-vate	Total	Tempo-rary labor	Subsist-ence and supplies	Other supplies and equip-ment	Trans-ports-ation	Total	Salaries of park officers	Grand total	
	A (under 1/4 acre)	B (1/4 to 10 acres)	C (over 10 acres)	Total (classes A, B, and C)	On Gov-ern-ment lands	On pri-vate lands	En-tered parks															Con-fined to out-side areas
	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Acres	Acres	Acres	Acres	M. B. F.	M. B. F.	M. B. F.	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	
General Grant																						
Glacier																						
Grand Canyon	10	7	2	19	1	19	3	2	1	456	2	42	42	42	579.68	91.83	103.90	39.38	710.89	62.00	772.89	
Hot Springs	2	1		3	3	3									622.67	143.03	23.96	23.96	1,899.56	103.66	1,003.22	
Lassen Vol- canic	7	3	3	13											280.29	35.42	2.07	22.87	340.65	57.26	397.91	
Mesa Verde																						
Mount Rainier																						
Rocky Moun- tain																						
Sequoia	2	2		4	3	1									1,915.04	814.35	2,057.17	795.25	5,581.81	553.00	6,134.81	
Yellowstone	8	1	3	12	10										26.25	7.05	1.25	1.00	35.55	8.00	43.55	
Yosemite	4	1	5	10	5																	
Zion	16	10	5	31	29																	
	3			3	3																	
Total	48	31	17	96	88	1	3	4	2,789	1,852	201	4,842	1,481	8	1,489	8,483.25	2,817.14	6,565.40	1,468.23	19,334.02	1,900.76	21,234.78

1 Glacier costs include suppression expenses on 4 fires not included in tabulation of forest fires.

Forest Fire statistics, calendar year 1928—Continued

Park	Causes of fires								Classification of fires according to cost of suppression											
	Lightning	Rail-roads	Camp fires	Smok-ers	Brush burn-ing	In-cen-diary	Lum-ber-ing	Mis-cellan-eous	Total, man-caused	Total	\$25 and under	\$26 to \$50	\$51 to \$100	\$101 to \$200	\$201 to \$500	\$501 to \$1,000	\$1,001 to \$2,000	\$2,001 to \$5,000	Over \$5,000	Total
	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber	Num-ber
General Grant																				
Glacier											1									1
Grand Canyon	12		2		1				1		16		2		1					1
Hot Springs				3	1				7	19	3									19
Lassen Volcanic				3					3	3										3
Mesa Verde	13								3	13	8		2				1			13
Mesa Verde	1																			1
Mount Rainier											1									1
Mount Rainier					2															2
Rocky Mountain																				2
Sequoia			2	2					2	2			1					1		4
Sequoia	3		1	1					4	4										4
Yellowstone	2		1	1	3	1		3	9	12	7	2	2						1	12
Yellowstone	2		1		2				3	5	4									5
Yosemite	6		7	8	5			5	25	31	24	2	1	1	1			1		31
Yosemite																				3
Zion	1			2					2	3	3									3
Total	38		13	21	14	1		9	58	96	68	8	8	2	2	3	1	3	1	96

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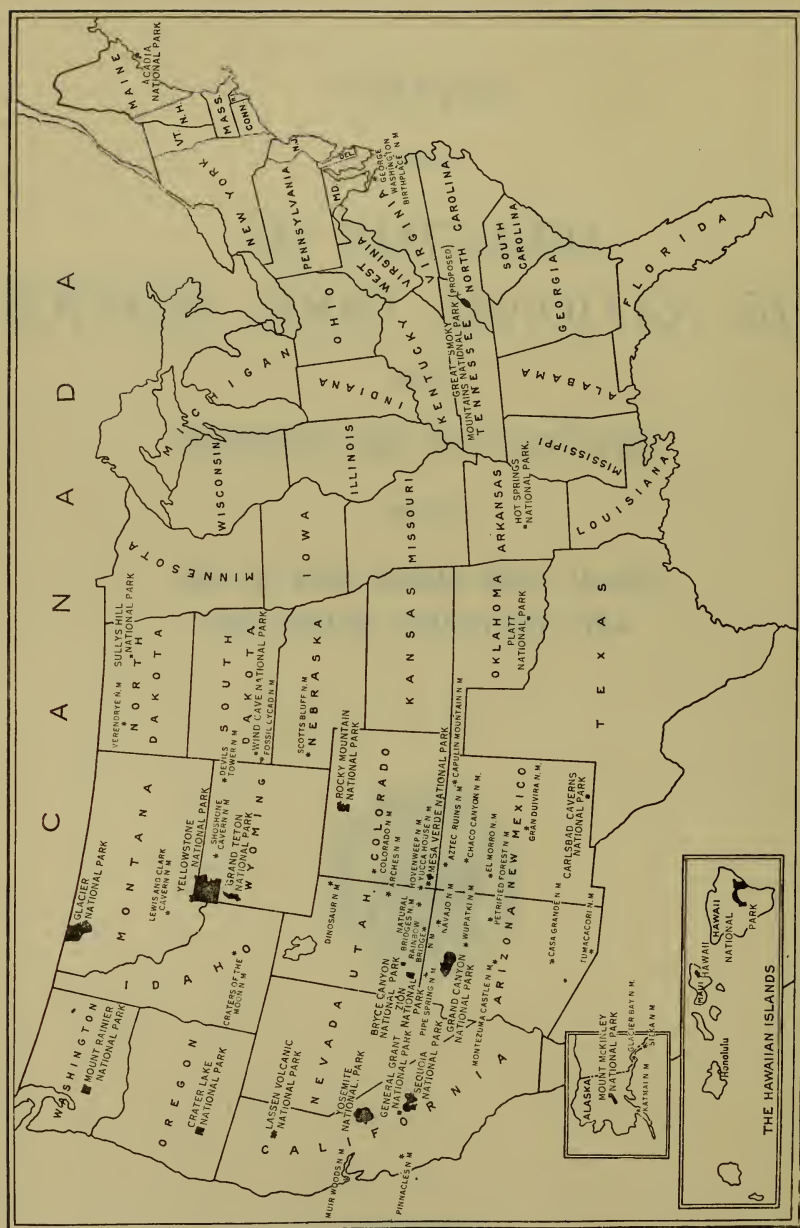


UNITED STATES DEPARTMENT OF THE INTERIOR

REPORT
OF THE
DIRECTOR OF
THE NATIONAL PARK SERVICE
TO THE
SECRETARY OF THE INTERIOR
FOR THE
FISCAL YEAR ENDED JUNE 30, 1930
AND THE TRAVEL SEASON, 1930



UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1930



LOCATIONS OF 23 NATIONAL PARKS AND 32 NATIONAL MONUMENTS ADMINISTERED BY THE NATIONAL PARK SERVICE

CONTENTS

	Page
Introduction.....	1
Outstanding events of the year.....	1
Deaths of former Director Mather and Assistant Director Lewis.....	3
Death of W. W. Wylie, park pioneer.....	4
Changes in the national park and monument system.....	4
Carlsbad Caverns given park status.....	4
Zion National Park.....	5
Rocky Mountain National Park.....	5
Yosemite National Park.....	5
Acadia National Park.....	6
New George Washington Birthplace National Monument.....	6
Craters of the Moon Monument enlarged.....	6
Papago Saguaro area no longer a national monument.....	7
Pending boundary problems.....	7
Yellowstone National Park.....	7
Mount Rainier National Park.....	7
Grand Teton National Park.....	8
Kings River country.....	8
Grand Canyon National Park.....	9
Bryce Canyon National Park.....	10
Eastern national park and monument projects.....	10
Great Smoky Mountains project.....	10
Shenandoah project.....	11
Mammoth Cave project.....	11
Proposed Everglades park.....	12
Colonial Monument project.....	12
De Soto Monument project.....	13
Other projects pending or investigated.....	13
Isle Royale.....	13
Apostle Islands and Menominee.....	14
Bandelier and Canyon de Chelly.....	14
Hoover Dam and Death Valley projects.....	14
Inspections of park and monument projects expedited.....	15
Unfavorable report on Wallowa project.....	15
Elimination of private holdings.....	16
Educational and research developments.....	17
Activities of educational committee.....	18
Museums.....	19
Guided trips and lectures.....	21
Auto caravans.....	22
Nature trails and exhibits in place.....	22
Yosemite School of Field Natural History and Junior Nature School.....	23
Field studies of parks made by groups from various universities and colleges.....	23
Visual education.....	23
Archeological research.....	24
Other scientific research.....	25
Animal conditions.....	26
Fish-culture activities.....	28
Senate Special Committee on Wild Life Resources.....	28
Forest protection.....	28
Fire control and prevention.....	29
Insect and tree-disease control.....	29
Preservation of park landscape.....	30
Reforestation.....	31
Sanitation and medical service.....	31
The parks in winter.....	33

	Page
Appropriations and revenues	34
Park road development	34
Park approach roads	35
Publications	36
Reclassification and reorganization of the National Park Service	36
Public-utility service	37
Cooperation from Federal, State, and private sources	39
Hawaii National Park now under Federal jurisdiction	40
Donations	40
State, county, and municipal park development	41
Park developments abroad	42
Legislation	43
Bills enacted into law	43
Other measures introduced or pending in the second session of the Seventy-first Congress which failed of enactment	46
Presidential proclamations	48
Executive orders	48
Individual park reports in Appendix D	48
Conclusion	49
Appendix A.—Organization of the National Park Service	49
Appendix B.—The national parks and monuments:	
The national parks administered by the National Park Service, De- partment of the Interior	52
The national monuments administered by the National Park Service, Department of the Interior	56
The national monuments administered by the Department of Agri- culture	59
The national monuments administered by the War Department	61
The national military and other parks administered by the War De- partment	62
Appendix C.—Travel and fiscal statistics:	
Visitors to the national parks, 1915-1930	63
Visitors to the national monuments, 1925-1930	64
Private automobiles entering the national parks during seasons 1923-1930	64
Automobile and motor-cycle licenses issued during seasons 1926-1930	65
Receipts collected from automobiles and motor cycles during seasons 1926-1930	65
Statement of appropriations made for and revenues received from the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917-1930, inclusive; also appropriations for the fiscal year 1931	66
Summary of appropriations for the administration, protection, and improvement of the national parks and national monuments, to- gether with the revenues received, for the fiscal years 1917-1931, inclusive	73
Statement of amounts transferred under the authority contained in the appropriation acts to transfer 10 per cent from one appropriation to another	73
Statement of appropriations and authorizations for road and trail work in the national parks and national monuments	74
Appendix D.—Reports of officers in charge of the national parks, monu- ments, and engineering, educational, landscape architectural, and for- estry divisions; also reports on sanitation, fish-cultural operations, and survey of wild-life conditions:	
Acadia National Park	75
Bryce Canyon National Park	77
Carlsbad Caverns National Park	81
Crater Lake National Park	83
General Grant National Park	89
Glacier National Park	91
Grand Canyon National Park	98
Grand Teton National Park	106
Hawaii National Park	108
Hot Springs National Park	112
Lassen Volcanic National Park	115

Appendix D.—Reports of officers in charge of the national parks, monuments, and engineering, educational, landscape architectural, and forestry divisions; also reports on sanitation, fish-cultural operations, and survey of wild-life conditions—Continued.

	Page.
Mesa Verde National Park.....	118
Mount McKinley National Park.....	127
Mount Rainier National Park.....	129
Platt National Park.....	137
Rocky Mountain National Park.....	138
Sequoia National Park.....	145
Sullys Hill National Park.....	151
Wind Cave National Park.....	152
Yellowstone National Park.....	154
Yosemite National Park.....	163
Zion National Park.....	172
The southwestern national monuments.....	178
Craters of the Moon National Monument.....	181
Muir Woods National Monument.....	181
Report of civil engineering division.....	181
Report of landscape architectural division.....	186
Report of field educational division.....	189
Report of forestry division.....	194
Report of sanitation division.....	198
Report of fish-cultural inspections and activities.....	200
Report of survey of wild-life conditions.....	202

ANNUAL REPORT OF THE DIRECTOR OF THE NATIONAL PARK SERVICE

DEPARTMENT OF THE INTERIOR,
NATIONAL PARK SERVICE,
Washington, D. C., October 9, 1930.

THE SECRETARY OF THE INTERIOR.

SIR: I submit to you herewith the fourteenth annual report of the National Park Service. As in past years, it covers activities and progress in the field of national parks in general for the fiscal year ended June 30, 1930, although for comparative purposes in connection with travel statistics the travel year is considered as ended September 30. Progress on road and other construction is also reported on a seasonal rather than a fiscal year basis.

Travel to the national parks and monuments made a good showing despite the fact that the nation-wide financial depression was reflected in a decided falling off of rail travel to the parks, and in the number of people using the hotels. Another factor in lessening the travel increase was the abolishment of the Papago Saguaro National Monument, which last year had 87,600 visitors, and for which only 50,000 were reported up to the time of its change of status. The increase in park travel was due to the private motorist who frequently used his own camping equipment or made use of the housekeeping accommodations in the public auto camps.

National park travel increased to 2,774,561 visitors, as against 2,680,597 in 1929. The total of 3,246,656 visitors to both classes of reservations the past year was 1,608 less than the previous high record of 1929.

My official inspection trips this season included, in May and early June, the Mammoth Cave, Great Smoky Mountains, and Shenandoah projects, and the Acadia National Park. Between June 21 and October 3 all of the big western parks as far east as Wind Cave were inspected, as well as the Casa Grande, Tonto, Montezuma Castle, Petrified Forest, El Morro, Chaco Canyon, Aztec Ruins, Devils Tower, and Pipe Spring National Monuments and the proposed Badlands Monument in South Dakota.

OUTSTANDING EVENTS OF THE YEAR

The acquisition of the most important timber stands in private ownership in Yosemite National Park, at a cost of approximately \$3,300,000, ranks high among important happenings of the year. Half of this cost was contributed by John D. Rockefeller, jr., who for so many years has evinced a keen interest in the welfare of the national parks.

The National Park Service was reclassified as one of the largest and most important bureaus of the Department of the Interior and its key positions reallocated accordingly. It was also enlarged July 1 through the authority granted to expand personnel and quarters.

A new branch of education and research was established in the Washington headquarters of the Service, headed by a prominent educator who has been identified with educational activities in the national parks since their inception. Several new trail-side museums have been built in the parks and there were other extensions of the educational program.

The first concrete step was made toward the establishment of the national parks authorized in the southern Appalachian region when Secretary Wilbur accepted, upon behalf of the United States, deeds to approximately 150,000 acres of lands within the approved boundaries of the Great Smoky Mountains National Park project. Under congressional authority to undertake administration when this amount of land became available, a small ranger force has already been installed.

Authority was secured for the employment of specialists and experts for investigations and examinations of lands to determine their suitability for national park and monument purposes. This will greatly relieve the staff officers, upon whom has rested the greater part of the burden of such examinations in the past, and at the same time will facilitate the work of examination in a manner more satisfactory to the proponents of the various projects.

The Carlsbad Caverns National Park was established through congressional action changing the status of this area from that of a national monument.

The definite entrance of the National Park Service into the field of preservation of historic shrines was marked by the establishment of the George Washington Birthplace National Monument, at Wakefield, Va., and the authorization of the Colonial National Monument.

Road and trail improvement was pushed on a basis involving the expenditure of approximately \$5,000,000 annually.

The spectacular Zion-Mount Carmel Highway between Zion and Bryce Canyon National Parks, Utah, was brought to completion, and at its dedication on July 4 governors of 15 States of the Union participated.

During my inspections last summer it was evident that we have at least attained some very important and tangible results in our landscape and road construction work. This year for the first time several new roads were opened. The Zion-Mount Carmel Highway with its 5,600-foot tunnel, undoubtedly is the most spectacular and unusual feat of road engineering yet undertaken. The road system on the north rim of the Grand Canyon, including the highway to Cape Royal and Point Imperial and out to the new north entrance was completed and thrown open. It is now being paved. On the south rim, the Desert View Road is receiving a permanent surface so that Grand Canyon now has a splendid new system of highways on both north and south rims. In Yosemite Park, several miles of the new Wawona Road were opened, giving the people of California an idea of what that fine new all-year road to the Mariposa Big Tree will be. Crater Lake's road system is complete to the rim of the lake.

and the roads have a dustless surface, having been either paved or finished with oil-processed top. In Rainier, the new road to Paradise Valley by Ricksecker Point is finished. This road, rebuilt of course, now stands out as the finest thing of its kind in the Northwest. The Yakima Park Road was used this year for the first time and it is almost as spectacular as the Paradise Valley Highway.

In Glacier Park the west side portion of the Logan Pass or Transmountain Road has been used more than ever before and tourists are overwhelmed by the majestic views and beauty of the scenery. In Yellowstone the road over Sylvan Pass is finished, as well as the new Gibbon Canyon Highway and the road to Inspiration Point and Artist Point. In Rocky Mountain it is possible for people to view the new highway and realize what an extraordinary road we are building there. Seven miles of this road will be at an altitude of over 12,000 feet. The new road to the Mesa Verde Plateau is finished and will be surfaced next year.

The landscaping of these roads attracted quite as much attention as the location of the roads themselves and the views to be obtained from them. Roadsides have been cleaned in most cases, old roads wiped out, the sloping of shoulders unusually well done, and in many places planting to cover up scars has been started. The most beautifully landscaped roads are in Mesa Verde.

Another thing that impressed me, and appealed especially to visitors, was the progress made in oiling roads and making them dustless. Sequoia, General Grant, Yosemite, Crater Lake, Mount Rainier, Glacier, Yellowstone, Grand Canyon, and Zion either had all their main-traveled roads given a permanent oil-processed surfacing or pavement, or at least received palliative measures to combat the dust menace. In Mount Rainier, Yosemite, and Sequoia there was oiling of trails. This work will be continued next year in other parks.

The excellent results achieved by the civil engineering and sanitation divisions in providing for the comfort and convenience of visitors also deserve special comment.

DEATHS OF FORMER DIRECTOR MATHER AND ASSISTANT DIRECTOR LEWIS

The personnel of the National Park Service, both field and Washington, was greatly saddened by the deaths of former Director Stephen T. Mather and Assistant Director W. B. Lewis. Both became engaged in national park work some time before the Service was established, bearing the responsibilities, trials, and discouragement not only of organization but of reorganization. There is no doubt but that their faithful devotion to the work and their enthusiastic endeavors to bring it up to the highest standards in the quickest possible time shortened their spans of life. They gave more of themselves than was humanly possible, if strength were to be conserved.

Mr. Mather died in Brookline, Mass., January 22, 1930, as a result of the stroke he suffered in November, 1928, when he went to Chicago to vote in the presidential election. No better epitaph could be conceived than that uttered by Representative Cramton, of Michigan, on

the floor of the House when, in announcing Mr. Mather's death, he said: "There will never come an end to the good that he has done." His retirement from park activities in 1929 was reported in the last annual report with a brief résumé of his most outstanding work.

The recipient of many honors during his lifetime, Mr. Mather last April was posthumously awarded the public-welfare medal of the National Academy of Sciences for "his meritorious work in the application of science to the public welfare."

Mr. Lewis's death occurred August 26, 1930, at his home in Chevy Chase, Md., following a long illness. Appointed superintendent of Yosemite National Park in 1916, he served in that capacity for over 11 years. For the first four years of this period, in addition to the administrative work and reorganization of park utilities, he acted as his own engineer and personally supervised all construction work. In 1927 ill health, brought on by his untiring devotion to his work, made necessary an extended leave. The following July he was appointed assistant to the director and later assistant director in the Washington headquarters in charge of the branch of lands. He initiated the tremendously important work of acquiring the private holdings in the national parks and played a large part in the recent purchase of the Yosemite sugar-pine holdings through the cooperation of Mr. Rockefeller. Handicapped as he was by a serious malady, he was one of the biggest producers the Washington office ever had, and was always smiling, happy, and courageous.

So two of our beloved comrades have gone on ahead in the short span of less than a year.

DEATH OF W. W. WYLIE, PARK PIONEER

W. W. Wylie, who in the eighties began the establishment of national-park accommodations for persons of small means, died in Los Angeles February 7, at the age of 82. Mr. Wylie first established the "Wylie Way" system of camping in the Yellowstone. This was the forerunner of the lodge system still in use there. Many years later, but while these areas were comparatively unknown, he pioneered in the establishment of Wylie Way camps in Zion National Park and at the north rim of the Grand Canyon.

CHANGES IN THE NATIONAL PARK AND MONUMENT SYSTEM

The total area of the national park system is now 12,431.63 square miles, an increase of 313 square miles since the submission of the 1929 annual report. The total area of the monuments has decreased from 3,728 square miles to 3,724.03. These changes were caused partly by the establishment of new reservations and partly through boundary revisions and eliminations. There are now 23 national parks and 32 national monuments.

CARLSBAD CAVERNS GIVEN PARK STATUS

The Carlsbad Cave National Monument was given park status by act of Congress approved May 14, 1930, and its name changed to that of Carlsbad Caverns National Park. Its total area is now only slightly over one square mile, but the act giving park status also

authorized the President to add to it by proclamation, upon the recommendation of the Secretary of the Interior, surrounding lands up to a total of 193 square miles additional. An investigation will be made by department experts to determine how much of the authorized lands should be added to provide adequate surface protection to the caves, which extend for miles underground, and also possibly to take in caves not yet explored.

The giving of park status to this area was of especial importance in that it gave recognition to the fact that the Carlsbad area is one of the most spectacular of underground wonders in America and, probably, anywhere in the world.

ZION NATIONAL PARK

Zion National Park was enlarged to a total area of 148.26 square miles through the addition of 17,900 acres of land by act of Congress approved June 13, 1930.

Through the addition of this new area, on the southeast, south, and southwest boundaries of the park, offensive landscape conditions near the park entrance can be eliminated. The upper section of Clear Creek Valley, through which is located portion of the new Zion-Mount Carmel Highway, was given protection, as were a number of excellent cliff ruins in the Parunuweap Canyon. Additional camping space was also provided for visitors and some land added which is suitable for the grazing of deer and mountain sheep, animals native to the Zion region which had come near to extinction. In addition to these very practical reasons for enlarging the park some of the territory added is of unusual scenic value.

ROCKY MOUNTAIN NATIONAL PARK

Through the addition of approximately 14,144 acres of land, the area of Rocky Mountain National Park was increased to 400.52 square miles. The extension was made by proclamation of President Hoover dated June 25, 1930, under authority of the act of Congress approved June 21.

This added to the park the headwaters of the Colorado River in the Never Summer Mountains, a magnificently scenic area. It is also of interest from a geological standpoint and topographically is a natural unit of the park. Through it will be constructed a portion of the new Trail Ridge Road.

YOSEMITE NATIONAL PARK

The pending adjustment of Yosemite boundaries, mentioned in the thirteenth annual report, was put into effect by presidential proclamation dated April 14, 1930, and added 7,725.19 acres to the park. This brought into the park impressive sugar-pine stands in the watershed of the South Fork of the Tuolumne River, which were threatened with imminent lumbering activities and which formed part of the land acquired in the great Yosemite timber deal described on page 16. A further addition of 960 acres in the Mather section of the park was authorized by Congress during its last session, but this has not yet been consummated.

ACADIA NATIONAL PARK

The Acadia National Park was extended by the addition of 229 acres of land included in the Seawall Naval Radio Station, transferred from the Navy Department to the Department of the Interior, under congressional authority approved May 23, 1930. The land was no longer needed for naval purposes.

A further addition of approximately 412 acres was added through the acceptance of deeds donated by George B. Dorr, superintendent of the park, and the Hancock County trustees of public reservations. The total area of the Acadia National Park is now 16.72 square miles.

NEW GEORGE WASHINGTON BIRTHPLACE NATIONAL MONUMENT

The act of Congress approved January 23, 1930, establishing the George Washington Birthplace National Monument and placing it under the administration of the National Park Service, marks the entrance of this Service into the field of preservation of historic places on a more comprehensive scale.

The old homestead in which George Washington was born was destroyed by fire on Christmas Day, 1780, but parts of its foundations are still in place, and a study has been made of them and of old records so that a house of the period and probable size in which George Washington was born, and of the type used by families of Washington's circumstances, may be constructed and furnished by the time of the bicentennial celebration in 1932. Bricks for use in the construction work are now being made by hand at Wakefield from native clay.

Work in connection with the house and surrounding grounds is being carried on by the National Park Service, in cooperation with the Wakefield National Memorial Association, to which is due the credit for the preservation of the grounds. In addition to arousing public opinion in favor of preserving Wakefield, the Memorial Association bought 100 acres of historic lands and in addition is spending approximately \$50,000 on the project. This land is now being turned over to the Federal Government for administration as part of the monument.

In recognition of this public-spirited action, Congress during the past year appropriated \$80,000 for the Wakefield work, \$30,000 for moving the granite shaft which has marked the birth site and other work, and \$50,000 for construction of the house and improvement of the grounds.

A further tract of approximately 254 acres of land, which was purchased by John D. Rockefeller, jr., to save it from commercialization, will also be turned over to the Government as part of the monument. When these transfers are completed the area of the George Washington Birthplace National Monument will be approximately 365 acres.

CRATERS OF THE MOON MONUMENT ENLARGED

By presidential proclamation dated July 9, 1930, there was added to the Craters of the Moon National Monument an area of 37 acres containing a spring needed in connection with road construction and administration of the monument.



Photo by Lindley Eddy Studios

SCENE AT DEDICATION OF MOUNT WHITNEY TRAIL



Photo by W. L. Huber



Photo by W. L. Huber

SCENES ALONG HIGH SIERRA TRAIL, SEQUOIA NATIONAL PARK. THIS TRAIL
WHEN COMPLETED WILL JOIN THE MOUNT WHITNEY TRAIL



Photo by Joseph Joffe

OLD FAITHFUL MUSEUM, YELLOWSTONE NATIONAL PARK



Photo by Joseph Joffe

NEW MUSEUM AT NORRIS GEYSER BASIN, YELLOWSTONE NATIONAL PARK

PAPAGO SAGUARO AREA NO LONGER A NATIONAL MONUMENT

The national monument status of the Papago Saguaro area was abolished by act of Congress approved April 7, 1930, and the land diverted to various uses. This action was based upon realization of the fact that the lands in question were more suitable for local and State uses than for national preservation.

On the other hand, when one passes through this monument, on the main road from Phoenix to Tucson, and realizes how well the natural condition of this area has been maintained, it is quite impossible to avoid regretting that the monument could not have been continued as a guaranty against the erection along the road of unsightly signs and other structures that are apt to arise in a region so inviting to tourists in winter.

PENDING BOUNDARY PROBLEMS

Although excellent progress was made during the year in the adjustment of park boundaries to make them include important scenic areas and also in aid of good administration, there still lies before the Service the task of securing several other important adjustments before the national park system will be properly rounded out. Considerable study was given to these projects, both by field investigations and by consideration of available facts.

YELLOWSTONE NATIONAL PARK

As stated in the last annual report, the Yellowstone Boundary Commission was appointed by President Hoover under congressional authority to determine the advisability of further changing Yellowstone Park boundary lines, with particular reference to the southwestern and southeastern sections. Field investigations were made during the summer of 1929, and during last winter the material collected was assembled and considered, and later a report was prepared and submitted to the President. The details of this report have not yet been made public.

The two areas under consideration by this commission were the Upper Yellowstone region, long proposed by park authorities for addition to the park, and the Bechler River Basin, now portion of the southeastern section and desired by irrigation interests for a reservoir site. The elimination of this area from the park has been consistently opposed by the National Park Service.

MOUNT RAINIER NATIONAL PARK

The most important immediate boundary-adjustment problem is that of extending the east boundary of Mount Rainier National Park to include a portion of the summit of the Cascade Range. The new boundary would include Chinook Pass, which topographic conditions make the natural eastern gateway to the park. This is the most spectacular entrance, and it is imperative that it be included in the park. The proposed small section of the Cascade summit would add to and enrich the natural scenic features of the park and increase greatly its educational features. It would also simplify administration, protection, and development. Construction of the Ohanapecosh

Road by the National Park Service to join the new State road will not be feasible unless some boundary adjustment is made, as the only practicable routes outside the land proposed for addition would prove excessively expensive.

GRAND TETON NATIONAL PARK

Another important boundary adjustment under consideration at the present time proposes a large addition to the Grand Teton National Park of Wyoming. When this park was established in 1929 it was known that its lines were unsatisfactory and that ultimately it should be extended to a connection with Yellowstone National Park; that a considerable area east of the park should be added in order to protect the approaches to the majestic Teton Range; and that the tourist development at Moran and elsewhere should be included. In 1927 John D. Rockefeller, jr., undertook to acquire private holdings in the northern part of the Jackson Hole, first, in order to protect the approach to the Tetons from nondescript structures, billboards, and other menaces to the landscape, and, second, in order to assist in protecting the wild life of the region, particularly the elk and moose.

Purchases were begun in 1927 by the Snake River Land Co., a corporation organized by Mr. Rockefeller to purchase and manage ranch properties pending their final transfer to the United States for park and game-preserve purposes. This project is now well advanced. Nearly all of the important ranch properties have been acquired, although a few remain to be purchased. Between twenty and thirty thousand acres of these Jackson Hole ranch lands are ready for transfer to the United States when Congress has enacted legislation to protect them and the reserved public domain lying among and about them. It is proposed that most of the land shall be added to the Grand Teton Park, bringing the eastern boundary of this park from the Snake River to the forest boundary near the eastern side of the Jackson Hole.

This park project has recently received the consideration of the Senate Special Committee on Wild Life Resources, which visited the park and also the Jackson Hole. Besides several members of the committee, the Chief of the Biological Survey, the Assistant Forester of the United States Forest Service, George D. Pratt, president of the American Forestry Association, and the Director of the National Park Service were in the party. This proposed extension will involve a total of between two and three hundred square miles. I hope that action on this project will be taken at the forthcoming session of Congress.

KINGS RIVER COUNTRY

Ever since the days of John Muir lovers of natural scenery have urged the inclusion of the magnificently scenic Kings River country in a national park. During the past year, while no legislation was before Congress to effect this, serious consideration was given to the project by the various factions interested, and it is hoped that the progress made in adjusting differences of opinion will lead to putting the matter in shape to present to Congress during its next session with strong hope of early enactment. The United States Forest

Service and the National Park Service are in complete accord as to the area which should be given park status, either as an extension of the present Sequoia National Park or as a separate park, according to the expressed wishes of the local people. Should a Kings Canyon National Park be established, the present General Grant Park, only 4 square miles in area, would be added to it.

Of especial importance was the study of the area made by the Federal Power Commission, at the joint request of the Forest Service and the National Park Service, with a view to determining the value of power sites therein. Report made late in the spring by the commission engineer states that most of the big reservoir sites are infeasible, showing that the only method of obtaining a large amount of water would be by placing dams on all the higher mountain lakes.

After the receipt of the Federal Power Commission's report, studies of the entire situation were made by members of the Sierra Club, by Dr. John C. Merriam, president of the Carnegie Institution of Washington, and Dr. Wallace W. Atwood, president of the National Parks Association, both members of the advisory board on educational problems of the National Park Service. The reports of these investigators are not yet available, but are expected to furnish a sound basis for further representations to Congress.

I again revisited this area during the past season and must reiterate my sincere belief that the best interests of the country would be served by giving it national-park status. The entire area is stupendously awe-inspiring in the depths and heights of its canyons, and the ruggedness and continuity of its sky line from whatever angle seen. Its grandeur and sheer beauty are superb.

GRAND CANYON NATIONAL PARK

Additions to both the south and north rims of the Grand Canyon National Park are vitally necessary if that reservation is to serve fully its purpose as a national park. The necessity for this extension is based almost wholly on biologic facts. At the time the park was established the underlying thought was the preservation of its physiographic and geologic features, and practically no attention was given to the fact that the area was of unusual interest as a native wild-life refuge and zoological laboratory. Its biologic value has now become apparent, and the boundaries should be modified in such a way as to include complete representation of the fauna of the region and to provide the necessary areas for its maintenance. It is also important that a considerable area of native vegetation, as undisturbed as possible, be maintained.

In order to insure a properly balanced range for the support of a full representation of native plant and animal life, it has been suggested that a total addition of 620 square miles should be included in the boundary revisions, 348 square miles on the north rim and 272 square miles on the south rim.

Since the problem involves present management plans of the Kaibab deer herd by the Forest Service and the State of Arizona, it is a difficult one. Field inspections were made during the past summer and conferences held with officials of the Forest Service in an endeavor to reach an agreement.

BRYCE CANYON NATIONAL PARK

Lands south and west of the Bryce Canyon National Park, comparable with it in scenic and scientific interest, were studied during the summer by representatives of the National Park and Forest Services, with a view to recommending to President Hoover the addition of certain areas to the park. To expedite the adjustment of boundaries, congressional authority was granted last June for the addition of a total of 42,240 acres, or such part thereof as should be found desirable, by presidential proclamation upon recommendation of the Secretaries of Agriculture and Interior. The land in question lies within national forest boundaries.

EASTERN NATIONAL PARK AND MONUMENT PROJECTS

Excellent progress has been made during the year on the projects to establish national parks in the East and to expand the work of the National Park Service into the field of preservation of historic areas. Of especial interest are developments in the three park projects in the southern Appalachians, authorized by Congress in 1926 upon recommendation of the Southern Appalachian National Park Commission appointed by the Secretary of the Interior. One of the conditions precedent to the establishment of these parks was that the lands within their proposed boundaries as outlined should be donated to the Federal Government in fee simple, without expense to the United States.

Field studies and examinations of all three areas were made during the year by the Director and the Associate Director of the National Park Service. All possible assistance was also rendered by the staff of this Service to officials of the States interested in the successful culmination of the park plans.

Associate Director Arno B. Cammerer has been special representative of the Secretary of the Interior and contact man for the Service in all matters affecting the acquisition of these several eastern park projects.

GREAT SMOKY MOUNTAINS PROJECT

Partial realization of the project to establish the Great Smoky Mountains National Park came with the presentation to the Secretary of the Interior of deeds to 158,876.50 acres of land in the Great Smokies region. The presentation was made on February 6, 1930, by the Governors of North Carolina and Tennessee on behalf of their respective States. After examination of title and approval by the Attorney General of the United States, acceptance of the land on behalf of the United States followed on August 28, 1930.

This action was made possible by the provision in the enabling act authorizing the Secretary to accept, for administration and protection, an area of 150,000 acres within the boundaries of the proposed park. Not until a total of about 427,000 acres specified by Congress as the minimum area for full park status have been deeded to the Government and accepted will it be legal to develop the new park along the lines of the great western parks. Such development, however, will promptly follow the acceptance by the Government of the total minimum area.

Meanwhile, to carry out the authorized protective measures, two assistant chief rangers have been assigned to the area. John T. Needham, a trained park man from the West, has been placed in charge of the North Carolina area and Philip R. Hough, an experienced forester, in charge of the Tennessee portion. Later in the year it is planned to transfer to the Great Smokies Supt. J. Ross Eakin, who has been in charge of two of the major parks of the system during the past nine years. At present he is superintendent of Glacier National Park. Himself a West Virginian, Mr. Eakin has spent a great deal of time in the mountains of the South on engineering work for the United States Geological Survey and is thoroughly familiar with the country and its people. His selection is believed, therefore, to be an exceptionally happy one.

After January 1 it is planned to send a force of civil engineers, landscape architects, and sanitary engineers into the area to study the many impending problems along their specialized lines. This will expedite development of the area when the necessary lands have been acquired.

Funds for this preliminary work and for the protective activities were carried in the second deficiency act of 1930.

Most of the remaining area has been acquired or is under condemnation by the State commissions engaged in the acquisition of lands for this purpose, and it is hoped that within a very short time the development of the entire park as a great educational and recreational center may be undertaken.

SHENANDOAH PROJECT

In the effort to expedite the consummation of the Shenandoah project the minimum boundary lines of the proposed park have been definitely established on the ground. This has enabled officials of the State of Virginia to have a force of appraisers, working with local commissioners, engaged in the appraisal of the land in order to ascertain the exact cost of acquiring the lands needed for park purposes.

MAMMOTH CAVE PROJECT

Through the efforts of the Mammoth Cave National Park Association in obtaining subscriptions of funds and gifts of land, and the action of the State of Kentucky in authorizing funds of \$1,500,000 for the purpose, sufficient money became available during the year to purchase the lands needed for the establishment of the park as authorized by act of Congress. Already some of the area has been acquired by the association, and steps are now being taken to secure the remainder for transfer to the United States.

The law authorizing establishment of this park prescribes a minimum of 45,309 acres, including all the caves, for administration, protection, and development out of a maximum total of 70,618 acres. A representative of the Service, acting as representative of the Department, as a measure of cooperation with the State authorities, will lay out the minimum taking lines on the ground. This was done in the cases of the proposed Shenandoah and Great Smoky Mountains National Parks.

Inspections by myself and associates of the proposed park area, which is located in a superb limestone country, showed the scenery above ground to be equally as impressive as the caves. The combination of great caves below ground and unusual scenery above offers interesting possibilities in national-park development.

PROPOSED EVERGLADES PARK

Acting under direction of Congress, a study was made by a committee of national-park experts of the Everglades in the Cape Sable region of Florida, to determine the advisability and practicability of establishing a national park in that region. The committee inspecting the area consisted of the Director and Associate Director of the National Park Service; E. K. Burlew, Administrative Assistant to the Secretary of the Interior, and acting as the latter's personal representative; Supt. Roger W. Toll, of Yellowstone National Park; Dr. Hermon C. Bumpus, of the American Association of Museums; Dr. T. Gilbert Pearson, president of the National Association of Audubon Societies; Dr. M. W. Stirling, Chief of the Bureau of American Ethnology; and Dr. David Fairchild, famous plant expert and explorer. Hon. Ruth Bryan Owen, Representative in Congress from Florida, accompanied the party. The examination was made by means of dirigible, motor boat, automobile, skiff, and on foot.

While formal report has not yet been submitted to Congress, the committee has decided that the project measures up to the standards prescribed for national-park establishment. It is believed that the prospective educational value of the area equals that of any existing national park, and that the lands proposed for park status should be preserved in order to protect the primitive character of the country and its abounding wild life.

In this connection it is interesting to note that Cape Sable is 50 miles nearer the Equator than any other section of the United States, and in fact is 350 miles farther south than Cairo, Egypt. It presents an area of tropical flora and fauna encountered nowhere else in the United States.

COLONIAL MONUMENT PROJECT

Recognizing the great importance of preserving for the American people historic shrines of the first rank, Congress by act approved July 3, 1930, provided for the establishment of the Colonial National Monument upon certain conditions and directed that a survey of the region be made.

As proposed, this monument would include three areas where occurred events of great significance in our colonial period. One is Jamestown Island, site of the first permanent white settlement in the United States. Next is Williamsburg, the historic old town now being restored through the generosity of John D. Rockefeller, jr., which contained the first legislative building erected in America, the first public school, and one of the first colleges. The third of these areas is Yorktown, where, with the defeat of the British forces under Cornwallis, the colonial period ended and the United States entered upon its national destiny.



Photo by Crandall

MUSEUM AND INFORMATION OFFICE, JENNY LAKE CAMP GROUND, GRAND
TETON NATIONAL PARK



SUPERINTENDENT'S RESIDENCE, ZION NATIONAL PARK. REAR VIEW,
SHOWING MAGNIFICENT VIEW OBTAINABLE FROM FRONT OF HOUSE



Photo by Seoyen

PINE CREEK BRIDGE, ZION-MOUNT CARMEL HIGHWAY



Photo by Seoyen

WEST PORTAL OF MILE-LONG TUNNEL ON ZION-MOUNT CARMEL HIGHWAY

Mapping of the general area is now in progress in cooperation with the United States Geological Survey and the National and State Yorktown Sesquicentennial Commissions as a preliminary measure to laying out the actual boundaries of the proposed monument. Landscape and water-supply surveys are also planned for the near future.

An endeavor is being made to complete the surveys this fall so that an estimate of the cost of acquisition of the necessary lands may be presented to the new session of Congress. It is hoped to acquire the lands at Yorktown in sufficient time so that all facilities provided there for the celebration on October 19, 1931, may be of a permanent nature.

DE SOTO MONUMENT PROJECT

A project of long standing, which was inspected last winter in connection with the Everglades region and favorably reported, is the proposed De Soto National Monument in Florida. The area in question is a hilly wooded island near St. Petersburg, containing tropical vegetation and surrounded by picturesque bays and bayous which give it an extraordinary scenic beauty. It is known as Weedons Island.

Historically it is interesting because of its two groups of Indian shell mounds, which according to Dr. M. W. Stirling, Chief of the Bureau of American Ethnology, are apparently of different ages, and which are in an excellent state of preservation. It is evident that in prehistoric times the island was the center of a very considerable aboriginal population. Pottery recovered by the Bureau of Ethnology in excavations several years ago on Weedons Island is said to be the finest yet obtained in Florida. Available evidence also points to the island as the landing place of the Spanish adventurer Hernando De Soto in June, 1539.

Efforts are now being made by the local people to raise sufficient funds to purchase the island and present it to the United States.

OTHER PROJECTS PENDING OR INVESTIGATED

ISLE ROYALE

Interest in the Isle Royale project has continued unabated. During the summer the area was studied by members of the Senate Special Committee on Wild Life Resources and was also visited by one of the Service's expert collaborators. All of the public lands on the island are still withdrawn from entry, pending further developments. At present there are 9,121 acres of public land on the island and 2,240 acres in State ownership. The remainder of its 131,200 acres are privately owned. Altogether about 56,000 acres, or nearly half its area, are available for park purposes, as some of the owners have indicated their willingness to donate their lands for this purpose.

Last February, shortly after the death of former Director Mather, Representative Cramton, of Michigan, proposed the acquisition of the entire island for park purposes as a memorial to Mr. Mather and his keen interest in the project.

APOSTLE ISLANDS AND MENOMINEE

At the direction of Congress preliminary investigations were made late in the summer of the Apostle Islands and Menominee projects by Harlan P. Kelsey, expert collaborator of the National Park Service for the study of proposed parks. His reports are not yet available.

BANDELIER AND CANYON DE CHELLY

Two projects of long standing, involving the preservation of unusually interesting prehistoric Indian ruins, are the Bandelier and Canyon de Chelly. The former, in New Mexico, has been variously known as the proposed Pajarito National Park, or the Cliff Cities. The Pajarito Park was proposed in the closing years of the last century, and in 1900 the Secretary of the Interior ordered 163,620 acres temporarily withdrawn pending legislation. This withdrawal is still in force. Finally, when no headway was made with the park project, a portion of the area was included in the Bandelier National Monument, created in 1916, and placed under Forest Service administration. The Forest Service, which opposed the earlier project, is now committed to the establishment of a park of reasonable size. This area also was investigated late in the summer, the study being made by Dr. Clark Wissler, expert collaborator on park projects and also a member of the advisory board on educational problems of the National Park Service.

The Canyon de Chelly project, in Arizona, proposes the establishment of a national monument to include remarkable box canyons of red sandstone, cut to depths of 700 to 1,000 feet, in which the cliff dwellings were built. A bill satisfactory to the Indians has been drawn up in cooperation with the Indian Service and is expected to be introduced in the next session of Congress.

HOOVER DAM AND DEATH VALLEY PROJECTS

Two areas in the Southwest which have attracted attention for potential park or monument development are portions of the Hoover Dam region and of Death Valley.

Approximately 4,212 square miles in the Hoover Dam region of Arizona and Nevada were temporarily withdrawn from settlement by executive order dated April 25, 1930, pending a thorough study of the lands to determine the best use to which they could be put from a broad national standpoint. The lake to be formed by the raising of the Colorado River will be approximately 110 miles long and have two great arms, one extending about 40 miles into the Grand Canyon and making accessible by boat a scenic portion of the gorge which it is now practically impossible for the average person to reach. The withdrawn area is tributary to the site of this great lake, and appears to offer great possibilities of development for public use. The area is also interesting from a historic standpoint, and the suggestion has been advanced that old Fort Callville, associated with the early Mormon conquest of the desert region, be preserved and restored. All these possibilities will be carefully considered when the entire area is examined from the standpoint of future development and use.

For some time officials of the National Park Service have felt that a section of typical Death Valley scenery might logically be placed

in a national monument. Acting upon recommendation from the Secretary of the Interior, President Hoover by executive order dated July 25, 1930, temporarily reserved from entry an area of approximately 2,000,000 acres, pending classification of the land and determination of the advisability of giving portion of it monument status. Among the important natural features of the area are Ubehebe Craters and Telescope Peak.

INSPECTIONS OF PARK AND MONUMENT PROJECTS EXPEDITED

The importance of studying all park and monument projects with great care before reporting upon their feasibility was recognized by Congress during the past year, when authority was granted the National Park Service to employ specialists and experts to investigate and examine lands proposed for park and monument purposes. This includes the employment of one permanent land expert, with headquarters in Washington, who will probably be appointed this fall from our experienced field personnel, and of temporary specialists as needed. Under this authority it has been possible during the past summer to utilize the services of several expert collaborators, as mentioned previously.

In addition to inspections of projects as proposed through Congress and in other ways it appears logical that there should be some examination of the whole public-land area, with a view to determining whether there may be sections that should be reserved because of their scenic or scientific importance. Particularly is this true of much of the land of the Southwest, where there are a number of archeological exhibits of great scientific significance. It is believed that it is just as important to set aside public lands for scientific, educational, and recreational purposes as it is to classify them for agricultural, mineral, and other commercial purposes.

I wish to add here that only those who have endeavored in the past to make examinations of urgent park projects, with limited funds and even more limited time, can realize how great a step forward this is in national-park administration. On the other hand, it will be more satisfactory to the proponents of the various park and monument projects under consideration.

UNFAVORABLE REPORT ON WALLOWA PROJECT

The Wallowa Mountain region in northeastern Oregon was investigated last November by two experts of the National Park Service with a view to ascertaining the desirability of its being given national-park status. This inspection was made at the request of the Wallowa National Park Association, an organization formed to promote the project.

In submitting an adverse report upon the proposal these experts stated that the area is lacking in any outstanding feature that would give it a wide national interest or that would entitle it to consideration as a national park. The attractions of the region were recognized, however, and the possibilities of its development as a recreational area that would be a decided asset to eastern Oregon and the vicinity. The area, in fact, seems to offer excellent possibilities for State park development.

ELIMINATION OF PRIVATE HOLDINGS

More progress was made during the past year in the acquisition of private holdings in the national parks than at any time in the past. The biggest transaction was the Yosemite deal, in which 15,570 acres of land were involved and which cost approximately \$3,300,000. Half of the cost of purchasing these lands was defrayed by John D. Rockefeller, jr., the remainder coming from the fund provided by Congress for the acquisition of private holdings in national parks, as outlined in the 1929 annual report.

It is impossible to overestimate the importance of this Yosemite forest acquisition. It brought into perpetual Government ownership the finest remaining stands of sugar-pine timber in the area and reduced the total area of private holdings in that park to 5,034 acres. This total will be materially reduced when two pending deals are consummated. A tract containing 640 acres is now in course of acquisition with funds contributed by George A. Ball, of Muncie, Ind., as is another of about 380 acres, half the funds for the latter transaction being contributed through the cooperation of Dr. Don Tresidder, president of the Yosemite Park & Curry Co.

Additional timber holdings in the Tuolumne River watershed—fine stands of sugar and yellow pine—remain in private ownership outside the park. One can not help regretting that they are imperiled, and it is hoped by all friends of these majestic forests that they may yet be saved.

In order that the beauty of the Big Oak Flat Road may be unimpaired arrangements have been made between the Sugar Pine Lumber Co., the Forest Service, the State, and the Park Service to preserve the roadsides through selective cutting of the larger trees and careful removal of any trees that are taken out. Particularly interesting and valuable stands of timber which should be preserved untouched will be made the subject of exchanges between the Forest Service and the Sugar Pine Lumber Co.

A gratifying start has also been made toward eliminating the privately owned lands in Glacier National Park. Efforts have been directed particularly toward the region at the foot of Lake McDonald, where unsightly conditions as well as perplexing administrative problems prevailed. About 60 per cent of these lands have been acquired or are in process of acquisition. An allotment of \$198,000 of private-land funds was made available for this purpose during the year. Further funds will be needed to complete the eliminations in this section.

Important among the Glacier transactions is the deal to acquire the Lewis Hotel property, near the head of Lake McDonald, which is now in process of completion. The Glacier Park Hotel Co. has cooperated with the Government on a 50-50 basis in acquiring this important private tract. Two lots in Glacier Park were also purchased, at a total cost of \$1,000, through the cooperation of Hon. George R. Beach, Nathan Porter, George F. Perkins, J. Lester Parsons, and Harrie V. Schieren in matching the Federal funds.

The Northern Pacific Railway Co. has agreed to transfer back to the United States approximately 304.85 acres of railway holdings in Mount Rainier National Park, upon payment from Government funds of one-half the cost of the lands. By waiving the remaining

half cost, the railway in effect contributed to the purchase of the lands on a 50-50 basis. It is expected that this deal will be consummated in the near future.

A tract of land 80 acres in extent in Lassen Volcanic National Park, valuable primarily because of the fact that extensions to the park loop road were routed directly across it, has also been obtained for the Government.

In addition to the new lands added to the Acadia Park, an area of 45 acres within its boundaries was acquired by the Government.

In the monument field a most important acquisition is in progress. In the Petrified Forest National Monument, with a total area of 25,908.4 acres, 12,792.74 acres are in private ownership, representing original railroad land grants occupying alternate sections throughout the monument. This naturally precludes effective administration and also makes impossible the construction of an adequate road and trail system to make the principal features of the monument available to the visiting public. When the matter was brought to its attention the New Mexico & Arizona Land Co., owners of the private holdings, agreed to exchange the monument lands for other Government-owned lands in Navajo and Apache Counties, Ariz. Authority for this exchange was carried in the act of Congress approved by the President May 14, 1930. The private holdings in the monument have already been appraised and the company has been requested to select the lands it wishes to take in exchange, in order that further appraisals and final exchange may be made.

To further expedite the elimination of private holdings an appropriation of \$1,750,000 was carried in the 1931 Interior Department appropriation act for the acquisition of privately owned lands and standing timber in the national parks and monuments, this fund to remain available until expended. In addition, authority was given to use not to exceed \$200,000 of the unexpended balance of appropriations heretofore made for this purpose in full payment of the purchase price of certain lands, with the understanding that the funds later would be matched on a 50-50 basis by subsequent donations. While these funds were used to the best possible advantage in Glacier National Park, there still remains considerable property to be acquired in the Lake McDonald section.

At this time I wish earnestly to recommend that in the future provision be made for the purchase of these private holdings 100 per cent from Government funds. Much as I appreciate the cooperation of the public-spirited people who have assisted us so generously in the past, I feel that it should not be necessary to ask for private donations to save lands of national value.

EDUCATIONAL AND RESEARCH DEVELOPMENTS

Coordination of all educational opportunities in the national parks and national monuments will be greatly facilitated by the recent establishment of a branch of education and research in the Washington office. Authority and funds for this purpose were carried in the 1931 Interior Department appropriation act. This was one of the practical results of the investigations and recommendations of the Secretary's committee on study of educational problems in national parks.

Dr. Harold C. Bryant of Berkeley, Calif., was appointed chief of the new branch and assigned to natural history research problems in the field during the summer. He took up his duties in Washington late in September. Dr. Wallace R. Atwood was appointed assistant chief of the branch of education.

The National Park Service considers itself fortunate in securing the services of these men to further its work along popular educational lines. Doctor Bryant is outstanding in the fields of natural history and conservation. Ten years ago he assisted in the initiation of nature guide work in Yosemite National Park, through the cooperation of the California State Fish and Game Commission. So successful was the new endeavor, and so great the demand for similar service, that it rapidly spread to other parks and eventually led to the establishment of the new branch. Throughout this entire period Doctor Bryant has been connected with the work.

The enlarged program of educational activities of the National Park Service is based upon the following main general policies:

1. Simple, understandable interpretation of the major features of each park to the public by means of field trips, lectures, exhibits, and literature.

2. Emphasis upon leading the visitor to study the real thing itself rather than utilizing second-hand information. Cut and dried academic methods must be avoided.

3. Utilization of a highly trained personnel with field experience, able to interpret to the public the laws of the universe as exemplified in the parks, and able to develop concepts of the laws of life useful to all.

4. A research program which will furnish a continuous supply of dependable facts suitable for use in connection with the educational program.

Proper interpretation by ranger naturalists in accordance with the above policies is dependent on accurate scientific knowledge supplied by the specialist. The proper background of information will be built up by securing the cooperation of universities, scientific institutions, and scientific men in solving the numerous geologic and biologic problems which present themselves. Research along these lines carried on during the past season is outlined on pages 24, 25, and 26.

The interest displayed by visitors in the educational work has attracted to this branch of the Service men of keen scientific attainments, trained in explaining to others the earth and life sciences, both of which are so prominently exemplified in the principal features of the parks. The educational staff is still undermanned, but expansions made during the past season were a step in the right direction, and it is hoped to further increase the staff during the coming year. This is necessary both to meet the public demand for conducted nature tours and lectures and to enable the naturalists to spend a certain amount of time in scientific research.

ACTIVITIES OF EDUCATIONAL COMMITTEE

The committee on the study of educational problems in the national parks, appointed by the Secretary of the Interior for a term of two years to make an intensive study into problems in the educational



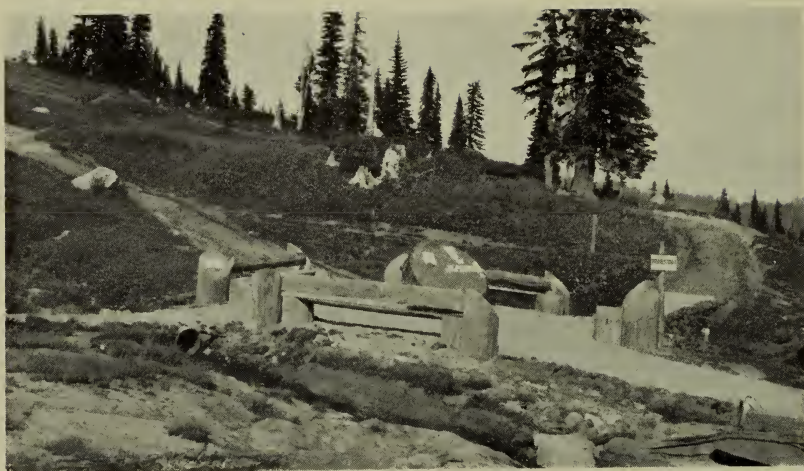
Photo by Lindley Eddy Studios

PEOPLE FROM AN AUTO CARAVAN AT MORO ROCK, SEQUOIA NATIONAL PARK



Photo by Grant

MESA VERDE AUTO CARAVAN LEAVING PARK HEADQUARTERS FOR TRIP TO
RUINS



TRAIL HUB, PARADISE VALLEY, MOUNT RAINIER NATIONAL PARK

ATTENTION!
FREE GOVERNMENT SERVICE
 TIME OF HIKES AND LECTURES
 ALL HIKES START FROM OLD FAITHFUL CONE

— MORNING —

9:00 AM	GREATER GEYSER	HIKE	—	2 HOURS
10:00 AM	GEYSER	HILL	"	1 HOUR

— AFTERNOON —

1:00 PM	GEYSER	HILL	HIKE	1 HOUR
2:30 PM	GREATER GEYSER	"	"	2 HOURS
3:00 PM	NATURE TRAIL	"	"	"
3:30 PM	GEYSER	HILL	"	1 HOUR

— EVENINGS —

7:00 P.M. SHARP BEAR LECTURES
FEEDING BEARS AT BEAR FEEDING GROUNDS
 8:15 P.M. ILLUSTRATED LECTURE AT MUSEUM
 9:00 P.M. OR AFTER-SHORT LECTURE AT
 ILLUMINATED EDITION OF
 OLD FAITHFUL GEYSER. U.S.N.P.S

SIGN PLACED NEAR OLD FAITHFUL CONE, YELLOWSTONE NATIONAL PARK

field, continued to function during the past year and to be of great assistance to the National Park Service. Results of field studies during the 1929 season by various members of the committee gave a general review of practically the entire park and monument field. Reports on these activities were submitted as follows:

Atwood, W. W., Glacier, Grand Teton, and Yellowstone National Parks.

Bryant, H. C., Yosemite, Grand Canyon, Sequoia, and Lassen Volcanic National Parks.

Bumpus, H. C., Acadia and Yellowstone National Parks.

Kellogg, Vernon, Rocky Mountain National Park.

Merriam, J. C., Grand Canyon, Sequoia, Yosemite, Crater Lake, and Mount Rainier National Parks.

Oastler, F. R., Isle Royale, Rocky Mountain, Mount Rainier, Yellowstone, Bryce Canyon, Mesa Verde, Grand Teton, Zion, Grand Canyon, McKinley, Aztec Ruins, Pueblo Bonito, Casa Grande, Bandelier, Petrified Forest, Glacier Bay, and Mount Olympus.

Wissler, Clark, Mesa Verde, Aztec Ruins, El Morro, Gran Quivira, Bandelier, also various archeological areas which are of importance in connection with studies of the national parks and monuments.

At its meeting on November 26 and 27, 1929, held in the Interior Department Building, examination was made of the entire group of reports for the purpose of determining and considering questions believed to be of fundamental importance in the development of the major features of the educational program in national parks. The decision was reached that further studies should be made through practical contacts with operations in the national parks, and various members of the committee visited the parks during the 1930 season. Reports of these investigations are not yet available. The committee again met in Washington on May 9.

The word "education," as applied to a particular branch of national-park activities, has at times seemed open to misinterpretation, as perhaps implying the formal type of education dispensed in institutions of learning. As used in the parks, it implies imparting to the visitor something which is a blending of the recreational, intellectual, and spiritual. At the request of the Director of the National Park Service, therefore, the committee on education gave serious consideration to the possibility of using some other term than "education" to define the educational functions in terms of use and enjoyment of the national parks. Discussion, however, finally led to the conclusion that, while this word in some measure may be disadvantageous in connection with a program for use of the parks by the whole people, no other name has been suggested which seems more desirable.

In this connection it was stressed that the educational activities of the National Park Service should be limited to those aspects of guidance of visitors concerning particularly the use of the parks involved, and that they should not extend to the teaching of subjects not illustrated in exceptional manner by the national parks.

MUSEUMS

Museum activities in the national parks continued to expand at an interesting pace. To expedite the work a field naturalist was appointed and assigned to the special field of museum planning and technique.

The Yellowstone Museum development, made possible under the grant of \$118,000 secured two years ago by the American Associa-

tion of Museums from the Laura Spelman Rockefeller Memorial, was continued and two additional museum units completed and put into use during the season. These were located at Norris Geyser Basin and Madison Junction. In the latter the history of the Yellowstone up to and including the establishment of the park is outlined, while the former contains exhibits of petrology, geochemistry, volcanism, and physiography explanatory of the near-by phenomena. Further exhibits of hydrothermal activity were added to the Old Faithful Museum which was opened to the public last year. A new trail-side museum to be located near Fishing Bridge at Lake and a trail-side shrine at Obsidian Cliff are the projects now under way. These new museum buildings will be ready for occupancy early next spring.

The installation and arrangement of exhibits in the Yavapai Point observation station and museum on the south rim of the Grand Canyon were brought to completion. Telescopes and field glasses, erected to show points of special geologic significance, together with the exhibits, unfold to the visitor in an absorbingly interesting way the story of the Grand Canyon. The story told in brief by small exhibits along the parapet where the canyon itself is in view is expanded by means of transparencies, exhibits, and motion pictures inside the museum. As reported previously, funds for the construction and installation of exhibits in this museum were obtained from the Laura Spelman Rockefeller Memorial by Dr. John C. Merriam, president of the Carnegie Institution of Washington and chairman of the educational committee on national parks, who has spent a great deal of time and thought on this project. Plans were also drawn for the erection of a small museum near Lipan Point, for which funds have been pledged by Mrs. Winifred MacCurdy as a contribution of "The Medallion" of Pasadena. The Gila Pueblo of "The Medallion" was engaged in research work at Lipan Point during the summer in an effort to obtain museum material. A general museum was also opened at park headquarters, the old administration building having been converted for this purpose, and a large room at the Grand Canyon Lodge on the north rim, through the courtesy of the Utah Parks Co., was fitted up and utilized as a temporary museum.

The unique museum at Mesa Verde National Park was augmented by the erection of several additional units and by the installation of newly excavated archeological material of prime importance. This museum in its especial field is said to be among the most valuable in the United States.

Plans were drawn for the Sinnott Memorial at Crater Lake National Park with funds appropriated by Congress for this particular purpose. Actual construction will be undertaken during the fall of 1930. This little observation station is planned to honor the memory of the late Representative Nicholas J. Sinnott, of Oregon, who did so much for Crater Lake Park. Meantime, museum collections were installed in the community building at the rim of Crater Lake, and these were viewed by a large number of visitors.

An interesting new development in connection with the Yosemite Museum was the establishment, in an open area back of the museum,

of a replica of an early Indian camp. Here an old squaw demonstrated basket weaving, cooking, and other Indian activities.

The museums at Lassen Volcanic and Hawaii National Parks continued to function as important features of the educational work.

The collections in the temporary museums at Zion, Glacier, Sequoia, Mount Rainier, and Rocky Mountain National Parks were increased during the year and again proved their popularity. It is important that permanent structures to house these collections be obtained as promptly as possible. In Sequoia Park in particular the extensive and valuable exhibits collected by Judge Walter Fry should be housed in a fireproof building.

A temporary museum was also started at the Grand Teton National Park to display specimens of the flora and fauna of the region.

Museum collections are on view at the Aztec Ruins, Casa Grande, Chaco Canyon, Gran Quivira, Montezuma Castle, Petrified Forest, and Tumacacori National Monuments, all in the southwestern group. While some of the exhibits were donated from private sources, most of them were excavated on the ground. It has been found from experience that visitors are unusually interested in this latter type of exhibit.

During the year plans previously prepared for adequate museum buildings at Rocky Mountain National Park and the Casa Grande and Petrified Forest National Monuments were carefully studied and revised in the light of fuller experience and understanding of local needs.

The interesting Indian museum established near the Sieur de Monts Spring in Acadia National Park was deeded to the Government during August. A perpetual lease for its maintenance and operation was given the museum trustees by the Government, as the trustees hold an endowment fund of \$60,000 for this purpose. An archaeologist is in charge of the museum.

When a suitable museum can be constructed at the Pinnacles National Monument an excellent private collection of Indian artifacts will be donated to the United States.

GUIDED TRIPS AND LECTURES

An outstanding feature in the popularization of the educational features of the parks and monuments is the guided trips. The walking trips, under the escort of a park naturalist or ranger-naturalist, are routed through areas rich in the particular natural phenomena exemplified in the park in question, and the objects of interest along the way pointed out and explained. The guided trips vary in length throughout the national park system from a few hours to those of several days' duration extending into the mountainous back country. Despite the increase in the educational personnel last year, it was not sufficient adequately to handle the large crowds desiring to take the nature trips, since the demand for this type of service increased in even greater proportions. Unquestionably this service is unique and one of the most popular rendered in the national parks. Increasing attention must be given to it as the years go by if the public demand is to be met satisfactorily.

The lecture service also was greatly extended during the past year, and again in this case a far greater number of visitors were reached than ever in the past. The lectures were given by members of the educational staff in the hotels and lodges, in the community houses, or at the camp fires in the public automobile camp grounds, in the museums, and at such specialized places as the Old Faithful geyser field of Yellowstone, and at the bear-feeding grounds in many of the parks. An interesting innovation in the Yosemite last year was the evening camp fire at the museum, where a special Indian program was given and local Indians gave their native dances, played their games, and sang their tribal songs. Visiting scientists cooperated freely with the National Park Service by assisting in the lecture work.

It is interesting to note that nature-guide service was introduced in the Canadian national parks during the past year by the Dominion Government. It is stated by the Canadian Department of the Interior that the nature guide's duties "will simply be to open the eyes of the visitors to the interesting things which most of us miss and to explain their meaning" and "to act as curator of the natural treasures and curiosities of the parks and to introduce all who are interested to the flowers, trees, birds, butterflies, and rocks, which can be seen along the main trails within easy reach of the chief resorts." During the season just ended this service was available by one nature guide at Jasper Park Lodge in July and at Lake Louise and Banff during August and September.

AUTO CARAVANS

Auto caravans, long a feature of the educational activities of Mesa Verde National Park, were extended to Yosemite, Yellowstone, Sequoia, and Grand Canyon National Parks. Through this arrangement visitors in their automobiles were conducted to points of interest. This new type of service proved immediately and vastly popular and great numbers of visitors took advantage of it. Daily trips were scheduled in these parks, and it is predicted that it will not be long before several trips a day will be made by auto caravan in all of the major national parks. In Mesa Verde National Park visitors for a number of years have been conducted in this manner to the various cliff dwellings, which they then entered under the escort of a naturalist or ranger.

NATURE TRAILS AND EXHIBITS IN PLACE

As officials of the National Park Service have stressed for years, the national parks in themselves are the real museums of nature. In order to assist visitors to make use of them, the Service during the past year developed a number of "exhibits in place," where attention is drawn to worth-while objects by means of labels. For instance, in the Grand Canyon National Park trails are being constructed to localities where particularly important fossils are imbedded in the walls of the canyon. Exhibits in place have also been developed in Yellowstone and Yosemite National Parks. In the latter studies are now being conducted under the direction of the Carnegie Institution preparatory to the establishment of a small station where the story of granite will be demonstrated.

The nature or self-guiding trails are closely allied to the exhibits in place, and were first initiated in an effort to supplement, to a certain extent, the guided trips. During the past year such trails were established and extended in practically all the parks and successful operation has been reported.

YOSEMITE SCHOOL OF FIELD NATURAL HISTORY AND JUNIOR NATURE SCHOOL

Again the Yosemite School of Field Natural History operated to capacity and 20 students of university grade were given training in field biology and geology and park administration. The course lasted seven weeks. More and more this school has become the training school for park employees.

A junior nature school was also conducted in Yosemite Valley during the summer, with its activity centered at the museum. The session lasted six weeks with a splendid enrollment. This service replaced the sporadic children's nature trips conducted in the past. A specially trained ranger-naturalist was in charge of the work, assisted by several volunteer workers. A nature walk followed the discussion at the museum and during its course children were encouraged to ask questions as to the "why" of the objects encountered along the way. The school was divided into groups based on ages and grades.

FIELD STUDIES OF PARKS MADE BY GROUPS FROM VARIOUS UNIVERSITIES AND COLLEGES

Utilization of the national parks and national monuments by universities and colleges as outdoor classrooms to supplement academic study of the natural sciences was noted in a growing degree during the 1930 summer season. Some of the most outstanding educational institutions of the country took advantage of the opportunities for such field work. Space is too limited, however, to mention them by name.

The National Park Service cooperated gladly with all these study groups, arranging facilities so that field work and demonstrations could be most effectively accomplished. Members of the educational staff in the various parks rendered valuable assistance.

It is desired to encourage this use of the parks and monuments, as it is realized that these areas are the ideal outdoor laboratories for practical study of geology, biology, archeology, and other field sciences.

VISUAL EDUCATION

Practical advancement was made in the field of visual education. The photographic work undertaken in the field last year on funds contributed from private sources was continued during the year, with the result that the National Park Service is now in possession of a large number of negatives of the chief scenic features and points of educational interest in most of the parks and a number of the southwestern monuments.

For the first time in its history the National Park Service has a small fund for use in pictorial work. The 1931 appropriation act included an item of \$3,000 which is available for obtaining photo-

graphic supplies, prints, and motion-picture films. None of this, however, may be used in payment of salaries.

As a measure of cooperation and to enable the Service to put its visual educational work on a sound footing, the publicity fund committee of the public utilities operating in the national parks has donated a quantity of photographic, slide, and motion-picture material for general distribution, and in addition has donated a fund of \$5,000 to be used in defraying the salary expenses of a clerk to assist in the upkeep of this material and also in purchasing necessary equipment and supplies. This clerk was appointed July 1 and has devoted his time to conditioning and distributing this material. In making this contribution to the work, the operators' committee stipulated that this assistance would cover the period of one year only, and that the Government would be expected to assume the full cost of such work thereafter.

ARCHEOLOGICAL RESEARCH

The southwestern area of the United States, in which are located several of the national parks and a number of the national monuments, is rich in archeological material. Each year research work along this line is carried on, and last season was no exception to the rule.

In Mesa Verde National Park, established because of its extensive cliff-dweller and pueblo ruins, the usual yearly explorations were omitted, owing to the absence of Superintendent Nusbaum during the winter.

Early in the fall, however, the superintendent and Earl H. Morris, an archeologist of wide experience in the Southwestern country, definitely established the fact that the ruin heretofore called "Earth Lodge A" was a typical structure of the Basket Maker III culture and not a distinct type of new structure as previously supposed.

A most important piece of work from an archeological standpoint was the establishment, by Dr. A. E. Douglass, of an unbroken tree-ring chronology extending from shortly before the year 700 A. D. to the present time. Applying this chronology to 49 beam cores or ends cut from the cliff-house structures in the park, he ascribed the date 1073 A. D. to the earliest beam of the series, one found in Cliff Palace, and 1262 A. D. to the latest, from Spruce Tree House. From this it seems apparent that the principal cliff-dwelling structures in the park were built between these dates.

In this park, and also in the Grand Canyon, expeditions from the Gila Pueblo were engaged in making extensive records of all ancient dwelling sites. The surveys being made by this museum, which are expected to cover a large part of the Southwest, will undoubtedly be an important factor in ultimately tracing the origin and spread of prehistoric Indian cultures. Excavations were made and a number of valuable artifacts recovered.

Jesse L. Nusbaum, superintendent of Mesa Verde National Park and archeologist for the Department of the Interior, was put on a per diem status last January to enable him to accept appointment as acting director of the new Laboratory of Anthropology at Santa Fe, N. Mex., devoting the greater part of his time to this work and at the same time being available when needed for important service at



FLOWER SHOW AT THE YOSEMITE MUSEUM



Photo by Grant

PREHISTORIC ANIMAL TRACKS, GRAND CANYON NATIONAL PARK



Photo by Lindley Eddy Studios

LODGE AREA, GIANT FOREST, SEQUOIA NATIONAL PARK. BEFORE LAND-SCAPING



LODGE AREA, GIANT FOREST, SEQUOIA NATIONAL PARK. AFTER LAND-SCAPING

the Mesa Verde. Under his competent direction the park has progressed remarkably along administrative, engineering, and archeological lines. The construction of the museum, administration building, and other headquarters structures along pueblo lines under his design and direction deserves especial commendation, as does the assistance of Mrs. Nusbaum, who cooperated in designing the buildings and the furnishings for them.

Interesting data on the old civilization of Casa Grande are expected to result from explorations of an expedition organized by the Los Angeles Museum and financed by Dr. Van Bergen, of New York City. Work was conducted on one of the older ruins on the north edge of the monument from January to May, and will be resumed this fall. During the summer months the expedition operated in the vicinity of the Navajo National Monument. Several rooms at Chettro Kettle in Chaco Canyon were excavated under the supervision of Dr. Edgar L. Hewett, of the University of New Mexico.

OTHER SCIENTIFIC RESEARCH

A number of other important studies were made by scientific organizations and individuals in cooperation with the National Park Service. Outstanding among these are the researches at the Grand Canyon, whose continuation by prominent scientists was made possible by Dr. John C. Merriam. One was a two weeks' pack-train trip to the little-known Nankoweap Basin country in the extreme northeastern part of the Grand Canyon, made by Dr. C. E. Resser, Curator of the United States National Museum, and Dr. A. A. Stoyanow, Professor of Paleontology of the University of Arizona, for the purpose of studying and collecting specimens of the fossil life of the Algonkian rocks exposed in that vicinity. The expedition was under the direction of Dr. David White, Research Associate of the Carnegie Institution. Because of the educational value to the park of the investigation, the National Park Service cooperated to the extent of furnishing the animals and a packer.

Other important studies included those in the paleobotany of the Yellowstone and in the granite of Yosemite, undertaken by the Carnegie Institution, and a survey of the fauna of Lassen Volcanic National Park by the Museum of Vertebrate Zoology of the University of California. A survey of the Yellowstone elk and a two-year study of the wild-animal life of the parks generally are given treatment in the section relating to wild-life conservation.

Splendid cooperation in the solution of important problems connected with the diseases of plants and trees has been accorded by the Bureau of Plant Industry, United States Department of Agriculture. A special research fund has been set aside by that bureau and Dr. E. P. Meinecke assigned to the work. Doctor Meinecke has visited a number of national parks and has helped to discover and offer means of control of various dangerous diseases affecting forest trees.

Dr. F. E. Matthes, of the United States Geological Survey, and Dr. Eliot Blackwelder, head of the department of geology of Stanford University, made a joint study of the glacial moraines of Yosemite National Park early in September.

Under the direction of Dr. Arthur L. Day, director of the geophysical laboratory of the Carnegie Institution, a well is being

drilled at Norris Geyser in Yellowstone National Park in an attempt to determine at what depth the heat is located that causes geysers. It is hoped to put the drill down until such heat and steam pressure are encountered as will prevent further drilling. In a similar experiment made last year a well was dug to a depth of 406 feet in the Old Faithful Basin, striking a temperature of 338° F.

From such investigations will come information useful in helping the public to understand the thermic activity so much in evidence in Yellowstone Park.

ANIMAL CONDITIONS

The outstanding event in the field of wild-animal protection is the two-year survey being undertaken by George Wright and Joseph Dixon, park naturalist aides. This is a personal contribution of Mr. Wright to the national parks. Realizing that the status of animal life is changing with alarming rapidity under present conditions, and that preservation within national parks is their only hope of escape from extinction for some species, Mr. Wright requested permission to undertake the present survey. It is hoped through these investigations to evolve solutions for some of the most urgent problems confronting the Service. The continuation of this important research work with Government funds is contemplated by an item contained in the National Park Service budget for 1932.

The detailed survey of the Yellowstone elk herds and the life habits of these animals, begun during the winter of 1928-29, was continued throughout the past year by William Rush, under a cooperative arrangement between the National Park Service and the Forest Service, the Bureau of Biological Survey, and the Montana Fish and Game Commission. The initiation of this survey was made possible through contributions from Thomas Cochran, of New York City. It is expected to yield valuable data to serve as a basis for the management of the big elk herds of Yellowstone National Park, as well as to provide information which will be of vital interest in the public program being conducted by the educational staff.

At this point I wish to express again the interest of the National Park Service in the work that the Bureau of Biological Survey is doing in the Jackson Hole country through Dr. O. J. Murie's study of the life history, habitat, and diseases of the elk. Doctor Murie's work has pointed the way for similar studies not only in the Yellowstone National Park but elsewhere in the system.

Despite the fact that animal conditions during the summer generally were excellent, grave fears are entertained for their safety during the coming winter. In the Yellowstone in particular the long drought so damaged the natural forage on the winter range that the outlook is extremely unfavorable. There is danger that a severe winter may cause disaster to some species. Large sums of money may have to be secured to purchase sufficient hay to enable the herds successfully to pass through the winter.

In several of the newer national parks, especially the Grand Teton, a marked increase in native fauna was noted during the past season as a result of park protection. In the Yosemite several truck loads of deer were taken from the valley, where they have been so numerous as to become a nuisance, into the upper reaches of the park where

these animals suffered serious depletion several years ago in connection with the control of the hoof-and-mouth disease.

Continuing an interesting experiment, just after the close of summer operations at the Grand Canyon National Park eight fawns from the Kaibab deer herd on the north rim were transplanted to the south rim by airplane. Other fawns are to be imported this fall. As an indication of their becoming acclimated to their new environment, the imported deer are now seen less frequently around headquarters, where they were at first cared for, and are making continuously greater use of the surrounding range. A survey of the Kaibab deer range was made in July by an expert of the Bureau of Plant Industry for the purpose of determining what could be done toward increasing the carrying capacity of the range. The large amount of precipitation throughout this region made range conditions unusually favorable during the summer. The Forest Service estimates the herd at about 30,000, despite heavy losses during the hunting season.

The band of antelope introduced at Indian Gardens in the Grand Canyon several years ago through the generosity of Dr. E. E. Brownell, of San Francisco, continues to hold its own, and six kids were born during the past year. New blood is needed in the herd, however, and it is planned next year to remove the old bucks and introduce new ones.

The shipping of buffalo was continued from Yellowstone National Park, 77 being sent to zoos and public parks during the year.

Observations taken in Mount McKinley National Park from an airplane flying over the mountains and covering places that man has not seen before, indicate that the previous estimate of 15,000 Dall sheep in this area is far below the actual number.

In Glacier National Park the St. Mary Valley elk herd on the east side, which after 10 years of care had increased to approximately 125 head, suffered serious depletion. Weather conditions made it impossible for them to obtain natural forage in the park during the winter, with the result that they were forced to drift out on the Blackfeet Indian Reservation, where many of them were killed. It is estimated that probably only about 20 per cent survived the winter.

Deer and other animals in Glacier are thriving, although nearly 100 deer were killed by passing trains near headquarters, despite the fact that often the engineers slowed down their trains in this section. The matter was taken up by the park superintendent with the vice president of the Great Northern Railway in charge of the operating department, who issued an order that trainmen on this section should turn off their headlights on seeing deer along the right of way, as this was found to be the factor that confused the animals. After this the casualties were few.

Of recent years the bear problem in the larger parks has become serious, due to the feeding of these animals by tourists. The result is that many of them now expect to receive their food in this manner and their depredations in tourist camps have increased. Also many people are bitten when feeding or pretending to feed the bears. A survey of the entire situation will soon be made to determine the best method of handling the problem.

FISH-CULTURE ACTIVITIES

Under the cooperative arrangement reported in my last annual report, fish-culture work in the national parks was in charge of a fish culturist of the Bureau of Fisheries, Department of Commerce, detailed to the national parks for this purpose. Under his supervision the work in the various hatcheries made interesting progress.

Federal hatcheries were maintained at Glacier and Yellowstone National Parks. In addition to keeping the waters of these two parks stocked, where possible fish from these hatcheries were furnished to other parks and to outside hatcheries.

State hatcheries cooperated in providing good fishing for the future tourist. The Oregon State hatchery at Butte Falls furnished fingerling trout for planting in Crater Lake and in the park streams; the State Fish and Game Commission of California furnished trout fry for planting in the lakes and streams of Lassen Volcanic and Sequoia National Parks and continued to maintain the hatchery in Yosemite National Park, and the Estes Park State fish hatchery continued to supply plantings to Rocky Mountain National Park.

The experiment of planting fish in the Bright Angel Creek, in the Grand Canyon National Park, proved entirely successful. Although the creek was extensively fished this year for the first time, the fishing there was excellent throughout the season. The Clear Creek planting was not so successful and further plants will be made. A study of Havasu Creek developed the fact that it apparently is suitable for trout and a plant is now being arranged.

SENATE SPECIAL COMMITTEE ON WILD LIFE RESOURCES

The Senate Special Committee on Wild Life Resources visited Yellowstone and Grand Teton National Parks the latter part of September. Original plans calling for a visit to the Upper Yellowstone country, adjoining Yellowstone National Park on the south-east, were abandoned for the present. The superintendents of the two parks accompanied the party on this trip, and I joined them in the Grand Teton. It was a pleasure to have the opportunity of discussing with the committee the wild-animal problems of these areas.

FOREST PROTECTION

Each year greater efforts are directed toward protecting the forests which add so much to the beauty of the national parks and to the comfort of visitors, and last year was no exception to the general rule. In fact, larger appropriations made possible the prosecution of preventive measures to a greater degree than heretofore.

For the present fiscal year, which began July 1, appropriations totaling \$96,850 were made available for the control and prevention of insect infestations, tree diseases, and forest fires. This made possible increased vigilance during the summer months, when the hazard is greatest, particularly through the purchase of fire-suppression equipment and the construction of fire lookouts.

FIRE CONTROL AND PREVENTION

The measures taken during the past two years under the direction of the fire-control expert proved of inestimable value this year. There were no large fires, and the many small fires that were bound to occur in such a period of severe drought were quickly detected and extinguished through effective control measures. In Mount Rainier Park in particular the excessively high temperatures and lack of rain were relieved to a certain point by the high humidity.

The most serious fire reported occurred in Glacier National Park, where the fire hazard was unusually great. Owing to the dangerous conditions the fire-control expert spent most of the month of August in the park. During this time lightning caused a fire in the Granite Park area which after smouldering in the duff for a day or so was discovered by a fire guard. Although men and equipment were rushed immediately to the scene, high winds carried the fire rapidly and it lasted for 10 days, burning approximately 800 acres of scattered timber. Approximately 90 men were on the fire during the greater part of this time. Fortunately the scar will not be conspicuous, since only a portion of it can be seen from the trail.

The survey of fire hazards in the parks was continued and detailed fire plans prepared for Mount Rainier, General Grant, Crater Lake, Yellowstone, and Rocky Mountain National Parks. Field work for the Grand Canyon program was also accomplished.

Training camps for instructing park men in fire-protective measures were held in Sequoia, Yosemite, Glacier, and Mount Rainier National Parks. The supervisors of neighboring forests assisted at these by detailing representatives who explained the use of the latest equipment and the most approved fire-fighting methods.

A fire-lookout station constructed during the season on top of Mount Harkness in Lassen Volcanic National Park 'is among the finest and best equipped in northern California. In addition to the usual maps and compasses, it contains an Osborne fire finder and a panoramic photograph mounted so that the location of the fire will be shown simultaneously on the photograph and the map when detected by the fire finder. This station serves a triple purpose. In addition to its importance in the fire-prevention program of Lassen, it affords visitors, who may easily reach it by trail, an opportunity to view the country through powerful glasses, and it also contains a seismograph, which, in connection with two others, hourly records the slightest quivers of the earth

At this point I want to express the appreciation of the National Park Service to those visitors who have cooperated by using care in handling their own camp fires, cigarettes, and other causes of conflagration, and in reporting promptly fires left by others. They have greatly assisted in the work of guarding the beauties of the national parks from devastation by fire.

INSECT AND TREE-DISEASE CONTROL

Again the effectiveness of the insect-control measures undertaken for several years past by the Bureau of Entomology and the National Park Service was demonstrated when a comprehensive air-

plane survey was made of Yellowstone National Park by an entomologist from the Coeur d'Alene station of the bureau. A gratifyingly low degree of infestation was observed in this area. No epidemic infestations were found in the Yosemite, although there were some endemic attacks in restricted areas.

There were numerous outbreaks of infestations in the forests in some of the other parks, however, requiring considerable control work. A serious epidemic of beetle infestation occurred in Glacier Park in the spring and control measures are being pushed against it. Another serious infestation in Crater Lake Park is now yielding to intensive control measures.

A bark beetle attack in Sequoia National Park was studied during the season and park rangers were trained by bureau entomologists in the detection and recognition of the insects and methods of control, preparatory to an intensive eradication campaign next year. In Zion National Park the ash-tree caterpillar was again in evidence and caused some concern.

Control measures were taken by blister-rust control experts of the Bureau of Plant Industry in the Pacific Northwest. A campaign of eradication of wild-currant and gooseberry bushes was carried on in sections of Mount Rainier National Park, where the white pine has been attacked. As is well known, the blister rust is transmitted to the trees from these bushes. White pines are not abundant in Mount Rainier, but in some areas they are of unusual scenic value.

PRESERVATION OF PARK LANDSCAPE

With larger use of the national parks and the resultant increase in the construction of facilities, the importance of careful planning in order to preserve the natural landscape has become more and more apparent. To enable it to handle the increased responsibilities upon it, the personnel of the landscape architectural division was enlarged during the year.

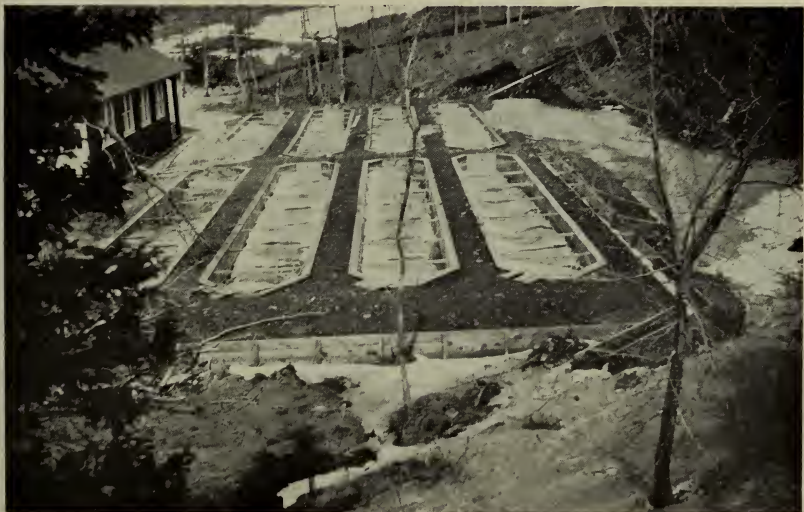
Nineteen-thirty is important in the annals of this division as the year in which the fruits of its labors to protect the roadside and the natural landscape generally during road and trail construction became definitely apparent, to the casual visitor as well as to the specialist. There is now a distinct contrast between carefully planned park roads and others planned on a strictly engineering basis. The cooperation of the road engineers aided greatly in achieving this result.

An interesting study of the season was that of the Mammoth Hot Springs headquarters area in Yellowstone National Park. This was made jointly by the landscape architectural division and Maj. Gilmore D. Clarke, landscape architect of the Westchester County Park Commission of Bronxville, N. Y. Major Clarke represented a committee of the New York chapter of the American Society of Landscape Architects, which has been cooperating in the study of this major problem. The resultant plan for the area is now being carefully studied.

A landscape study was also made of the Rocky Mountain National Park region for the purpose of working out the final boundaries to



REARING PONDS, YELLOWSTONE NATIONAL PARK. CAPACITY 250,000 LARGE TROUT



REARING PONDS, GLACIER NATIONAL PARK



Courtesy Bear Photo Service

MOUNT HARKNESS LOOKOUT STATION, LASSEN VOLCANIC NATIONAL PARK



NORTH FORK FIRE CACHE, GLACIER NATIONAL PARK

be recommended for the park and of means of restoring the natural landscape. Major Clarke, Charles W. Eliot, 2d, of the National Capital Park and Planning Commission of Washington, Chief Landscape Architect Vint, and Assistant Landscape Architect Peterson made this study, accompanied by Superintendent Rogers and myself.

The operators of the park public utilities did little in the way of major extensions during the year. Nevertheless, their efforts from a landscape point of view were most important, since they were directed toward picking up loose ends and generally giving a more finished appearance to their facilities. Also the lack of big projects on hand gave them opportunity properly to appraise what has been done in the past and to plan more carefully for future developments.

As a matter of cooperation with the Treasury Department the landscape architectural division prepared plans for a customs and immigration building at Babb-Piegan, Mont. The Bureau of Customs requested the preparation of such a design in order that its structure might be in keeping with those of Glacier National Park. Construction of the customs building will be carried out by the Office of the Supervising Architect of the Treasury.

Recently a member of the landscape force was transferred to the East, to assist in the development of the George Washington Birth-place National Monument, the Great Smoky Mountains National Park (proposed), and the proposed Colonial National Monument.

REFORESTATION

Twelve hundred three-year-old western yellow-pine trees were planted in the Aspenglen camp section of Rocky Mountain National Park during the year in cooperation with various local organizations. It is hoped that this will become an annual event.

In Sequoia National Park the nursery at Ash Mountain for the propagation of sequoia seedlings and other plants was extended. The nursery for reforestation in Acadia National Park was continued.

SANITATION AND MEDICAL SERVICE

Perhaps the most important problem confronting the National Park Service, in its contacts with the public, is the furnishing of adequate sanitary conveniences. This includes the supervision of the sanitary arrangements of the hotels and lodges, the installation of the proper facilities at the public camp grounds and other centers, the furnishing of pure water, mosquito and fly control, and other related matters. In several of the larger national parks the great number of visitors using the park facilities during the summer season gives rise to conditions similar to those of a fair-sized town.

In order that the best service possible may be available along these lines, the National Park Service has entered into an arrangement with the Public Health Service whereby one of its most competent engineers has been detailed entirely to national park sanitation work. Other assistance has been rendered as needed.

The Public Health Service also continued to cooperate by detailing one of its senior surgeons to serve as the superintendent of the Hot Springs National Park. Bacteriological examination of water sup-

plied the bathhouses was made regularly, and the park officials cooperated with the city of Hot Springs in various examinations and tests, and also on the question of rural sanitation. Special sanitary precautions were taken in connection with the free public bathhouse and clinic.

The outstanding sanitary achievement of the year in the national park system was the beginning of construction of an adequate sewage disposal plant in Yosemite National Park. With the growth of travel to the park, and its concentration in the small area of Yosemite Valley, the old plant became wholly inadequate. Intensive study of the problem resulted in the design for the new development which, when completed, will solve the sanitary problem of the Yosemite for many years to come. The new plant will be adequate to treat the sewage from an average population of 30,000 people, and for short periods could accommodate a population of 40,000. On an average it will be able to treat approximately 1,000,000 gallons of sewage a day, with a total of 1,250,000 for a few days at a time during the peak season. It is interesting to contrast present conditions with the early days of the park. Prior to 1921 the sewage on the floor of Yosemite Valley was discharged into the Merced River. Although a few septic tanks were in use, they did not prevent pollution of the river. Then in 1921 the Government built a sewage-disposal plant to prevent contamination of the river which provided many places with water for domestic purposes. This plant was designed to take care of the sewage from a population of 6,000 people, the maximum summer population at that time being 5,000 a day. During recent years the maximum summer overnight population has been 25,000, with 30,000 looming in the offing. The new plant therefore was an absolute necessity to safeguard the health of park visitors.

The installation of sanitary arrangements, including a water system and water-supply reservoir, was begun in the new Yakima Park development in Mount Rainier National Park under an allotment of \$32,800. It is planned to open this area next summer to visitors.

Important in connection with the water-supply problem was the activated sludge plant at the Grand Canyon. This continued to operate in a most satisfactory manner, reclaiming an average of 120,644 gallons of water a day at an average cost of approximately 35 cents per thousand gallons. The reclaimed water is used only for nondomestic purposes, but helps greatly in solving the problem of obtaining water in this desert country. Chemical and bacteriological examinations were made at regular intervals, and frequent laboratory examinations of the fresh-water supply were also made.

An urgent need of Platt National Park is the extension of the sewer system and the construction of a disposal plant. Since the sewer system is to be used jointly by the city, two State institutions, and the park, the city of Sulphur has voted a \$30,000 bond issue for this purpose, and the Service hopes to obtain an item of \$15,000 in its 1932 appropriations to cover the park's share of the cost of such installation.

Mosquito-control work was carried on in Hot Springs wherever breeding places were found, and particular care was taken to keep the public camp grounds free of mosquitoes. In Rocky Mountain

National Park local residents of Grand Lake cooperated on a dollar-for-dollar basis with the Park Service in mosquito control in the Grand Lake region, as the area treated is partly outside park boundaries.

Intensive efforts were made in Zion National Park to reduce both flies and mosquitoes. In Yosemite Valley the mosquito control was not as effective as previously, as unanticipated rises in the Merced River several times flushed out the oil. Considerable time was devoted to the study of this problem.

A study of conditions in Yellowstone National Park, which resulted in a number of cases of unidentified illness a year ago, was made by Surg. R. R. Spencer through the cooperation of the Public Health Service. The results of this study are not yet available.

The hospitals at Yellowstone and Mesa Verde rendered excellent service during the year. The completion of the W. B. Lewis Hospital in Yosemite National Park, replacing the inadequate old hospital, made for greatly improved medical attention to both park personnel and visitors. Physicians and trained nurses were available in practically all the larger parks during the summer season.

First-aid training classes were conducted in Mount Rainier Park during the winter months. All permanent rangers there are now fully qualified under Red Cross rules as instructors in first aid, as are many of the other permanent employees.

THE PARKS IN WINTER

Increasing winter use has been an interesting phase of national-park development during the past few years. This is in great measure due to the building of adequate all-year approach roads to these areas, but also is due largely to the awakened interest of Americans in outdoor life, winter as well as summer. The work of the public-utility operators in providing equipment and winter accommodations also deserves its share of the credit.

Heavy winter travel has greatly increased the responsibilities of the National Park Service, necessitating more maintenance work on roads, snow removal, and public-service by the rangers who formerly devoted their winter months to game patrols and other protective work. More than anything else, it has made necessary the construction of all lines of service affecting the public on an all-year basis. This necessarily involves higher building costs, particularly in the case of highways which must now stand usage by heavy traffic during and immediately following periods of severe storms.

Again last winter 12 national parks and a number of the southwestern national monuments were accessible to the traveling public. Those specializing in winter sports were Yosemite, Mount Rainier, Sequoia, General Grant, and Rocky Mountain. In the latter park the Colorado Mountain Club again held its annual outing.

Unusually mild weather marked the winter at both Yosemite and Mount Rainier National Parks. Nevertheless the winter program provided by the operators demonstrated the all-year usefulness of these parks. In the Yosemite over 100,000 visitors participated in the winter sports. A championship cup sponsored by President Hoover was won by the University of California. Speed and figure

skating experts gave special exhibitions in addition to the numerous contests held. A ski lodge was maintained at Snow Creek, both for the use of those enjoying snow sports in that area and as a snowshoe rest house on the winter route to the Tuolumne area.

Hawaii, Grand Canyon, Hot Springs, and Platt National Parks, with their moderate climates, are excellent winter resorts. Zion, Acadia, and Wind Cave National Parks also were accessible during the winter although in the present stage of development they offer no special inducements to the visitor at this time of the year and have no accommodations.

APPROPRIATIONS AND REVENUES

The total appropriations for the National Park Service for the fiscal year 1930 totaled \$7,813,817.18. Of this amount, \$209,996.18 was authorized in the first deficiency act of March 26, 1930, and \$5,381 in the second deficiency act of July 3, 1930. In addition, authorization was granted to enter into contractual obligations for road work up to \$2,500,000. It is especially gratifying to report that the cash donations to the national parks for the fiscal year ended June 30, 1930, amounted to \$1,781,453.05. These funds were deposited in the United States Treasury and expended under the same fiscal regulations which govern in expenditure of Federal funds.

For the fiscal year 1931 there was appropriated \$9,999,135, of which amount \$65,000 was authorized in the first deficiency act of March 26, 1930, and \$45,000 in the second deficiency act of July 3, 1930. Authority also was granted to enter into contractual obligations on road work up to \$2,500,000.

Despite the downward revision of automobile-entrance fees effective during the 1926 season, resulting in a decrease of revenues to \$703,849.60, as compared with \$826,454.17 received in 1925, the total income derived from the operation of the national parks this year for the first time reached the million-dollar mark; the exact amount being \$1,015,740.56.

The increased appropriations for the operation of the national parks and national monuments; the unusual degree of interest in these activities as reflected by donations from private sources; and the ever-increasing popularity of the areas under the jurisdiction of the National Park Service, as attested both in the revenues and the attendance records, all served to mark 1930 as the most successful year in the history of the National Park Service.

PARK ROAD DEVELOPMENT

Major road construction work was continued in the national parks and national monuments in cooperation with the Bureau of Public Roads of the Department of Agriculture. For the 1930 fiscal year \$5,000,000 in cash was appropriated for the construction, reconstruction, and improvement of roads and trails, with additional authority granted to enter into contractual obligations to the extent of \$2,500,000. Of the \$5,000,000 cash appropriation, \$4,000,000 was expended for payment under the contractual authorization provision in the 1929 appropriation act. There remained available, therefore, for

construction during the 1929 working season \$1,000,000 in cash and authorization of \$2,500,000 for entering into contractual obligations.

The road appropriation for the 1931 fiscal year is continued on a basis of \$5,000,000 in cash and authorizations totaling \$2,500,000. As only one-half of the 1931 cash had been obligated during the 1929 construction season, the 1930 construction season program provides \$2,500,000 in cash and \$2,500,000 in authorizations.

During the 1930 working season, in those parks located within areas where unemployment was most prevalent, it was possible to assist in the relief of this situation to some extent by advancing calls for proposals and accelerating contract placements. With unusually favorable operating conditions throughout the summer the expenditure of a larger sum of money than available would have been possible and would have been productive of results to an unusual degree. Our plans are being developed on a basis that permits an enlarged program whenever additional funds are made available.

Wherever possible Indians were employed as laborers on road and other construction work and also on some specialized work. Navajos, Havasupais, Hualpais, and Apaches were used during the past season. Next year it is planned to extend the employment of Indian labor, bringing in Indians from other tribes as this proves feasible.

PARK APPROACH ROADS

Public Law No. 90, approved April 7, 1930, provides for speeding up the Federal road-building program, authorizations for appropriations for Federal aid being increased for the fiscal years 1931, 1932, and 1933 from \$75,000,000 to \$125,000,000. By Public Law No. 179, approved May 5, the authorization for appropriations for construction of national-forest roads and trails was increased from \$7,500,000 to \$12,500,000 for the same three-year period. The annual appropriations for construction of roads and trails in national parks are now on the basis of \$5,000,000 annually.

At present, although the national parks are the great lodestones of travel to the West, no provision is made for speeding up construction of national-park approach roads whose primary value is to carry this national-park travel. In connection with forest roads which are of primary importance to the States, counties, or communities, provision in law is made for their construction within, adjoining, or adjacent to the national forests. The annual road and trail appropriations for the national parks and monuments are limited to construction of roads and trails within these areas.

From a business standpoint and with a view to a balanced program, it would appear essential to provide for financing the construction of the necessary approach roads in order that the maximum usefulness of the national parks may be enjoyed.

With the speeding up of the Federal-aid and national-forest road programs, and with the possibility of additional aid for approach roads, there is danger of the park-road program falling behind. With plans well advanced for economical expenditure of whatever sum may be granted, a construction authorization of at least \$6,000,000 annually would provide a better balanced and coordinated program.

PUBLICATIONS

The educational developments of the past two years have so awakened interest in national parks and monuments that the demand for literature regarding them has grown notably. Last year it was so great that a number of the free publications were exhausted some time before the 1930 supplies became available. At the present time several of the 1930 booklets are nearing the zero point, and we are again faced with a shortage of publications after the 1st of January, and perhaps sooner. The superintendent of Grand Canyon has just reported that his annual supply of circulars on that park should be increased 50 per cent to enable him to meet the demands of visitors to that area. The same condition prevails in most of the larger parks. There is also a crying need for publications on the fauna, flora, and other natural features of the parks. Larger appropriations for printing and binding, therefore, are imperative if we are to serve the public to the fullest degree.

Several years ago it was necessary to discontinue supplying motor-ing organizations, travel clubs, and other such organizations with supplies of park circulars adequate to meet the requests of prospective travelers calling at their offices. Through an arrangement made with the Superintendent of Documents of the Government Printing Office his office now quotes prices on these bulletins in large quantities, and this Service circularizes information regarding them to the interested clubs. The result is that a number of organizations have ordered supplies of Government booklets and issued them to visitors in their localities. While this in a slight measure relieves the pressure upon the Service, we are still far behind our normal yearly requirements.

The National Parks Portfolio, issued by this Service and sold through the Superintendent of Documents, continued to be the Government's best seller. The sale of this and other special park bulletins is now pushed in the museums and information offices of the various national parks, with the result that greatly increased receipts are turned over to the Superintendent of Documents.

RECLASSIFICATION AND REORGANIZATION OF THE NATIONAL PARK SERVICE

An appeal was made by the Secretary of the Interior from the action of the Personnel Classification Board in designating the National Park Service a "major bureau" instead of one of "the largest and most important bureaus" of the Department, with the result that the Classification Board, upon careful review of the entire matter, classified the Service as one of the most important bureaus of the Department of the Interior.

Later there was a reorganization and redistribution of the work of the headquarters office of the Service, and a reclassification of the staff officers to bring their positions more in line with similar positions in other bureaus of the Federal Government.

As now constituted there are four major branches, each under the supervision of a staff officer. Under the branch of operations, headed by Senior Assistant Director Demaray, come all the financial affairs



GARBAGE INCINERATOR, STANDARD DESIGN, YELLOWSTONE NATIONAL PARK



SEWAGE TREATMENT PLANT, GRAND CANYON NATIONAL PARK. AVERAGE
OF 120,644 GALLONS OF WATER RECLAIMED EACH DAY



SNOGO PLOW OPERATING IN 9 FEET OF SNOW ON RIM ROAD IN CRATER LAKE NATIONAL PARK



FROZEN LAKE, IN MOUNT RAINIER NATIONAL PARK, WHICH IS THE WATER SUPPLY FOR THE NEW YAKIMA PARK DEVELOPMENT

of the bureau, including the accounting, personnel, and operators' accounts divisions.

The branch of use, law, and regulation, under Assistant to the Director Moskey, is charged with all matters regarding legislation, contracts, permits, leases and other agreements, and rules and regulations.

The branch of lands, which was headed by the late Assistant Director Lewis, is charged with the handling of all land matters and the administration of the national monuments. Under it is the division of mapping.

The new branch of education, headed by Assistant Director Bryant, is charged with coordinating and supervising all the educational and research work of the Service, including the nature-guide, lecture, and museum work. Under it comes the division of publications, which handles the editorial and publicity work and the distribution of publications.

Several new positions were authorized for the 1931 fiscal year, among them the position of land expert mentioned elsewhere in this report. This necessitated increased quarters. Further space will be needed soon if the service is to expand along the most efficient lines.

PUBLIC-UTILITY SERVICE

A conference of the operators of the public utilities in the national parks was held in Washington last December at the invitation of the Secretary of the Interior. An outstanding accomplishment of this meeting was the formation of an organization of operators to work together for their mutual benefit and for the best interests of the visiting public.

Strong emphasis was placed upon the need for comparative uniformity in the service rendered. It is not intended that the parks should be in any way standardized, for a great part of their charm lies in their individuality. Uniformity in types of accommodations furnished and prices charged is most desirable, however, if the visitor to several different parks is to be thoroughly satisfied. Study was given this matter during the year, both by the operators and by Service officials.

The necessity of the operators submitting to the Government plans of operation and expansion over a five-year period was also stressed, in order that the National Park Service and the operators, working together, may provide the public with the best possible facilities for enjoying the parks. It is especially important that the service have before it information as to the operators' plans for the future when making up its own budget for roads, trails, and camp grounds.

It is a pleasure to report close cooperation from the operators during the year, both in meeting the request for five-year plans and in expansion of existing facilities as needed.

While practically all the operators have submitted their five-year programs, it was not possible for them to completely carry out their first-year program owing to disappointment in business this year. Few big undertakings were advanced, owing to inability to finance them satisfactorily. Despite the fact that travel was heavy, the

public conserved its funds, the majority of visitors coming in private cars, using personal camping equipment or staying at the housekeeping cabins. In view of the above, the public utilities' profits could by no means be measured in terms of park patronage. Instead, very few of them made money, and in some cases there were regrettable losses in operation.

The cooperation of the operators in the visual education work of the Service has already been acknowledged. In addition, the Yellowstone Park Transportation Co. paid for the printing of an additional 20,000 copies of the circular of general information regarding Yellowstone National Park, to supplement the Government's supply for distribution to park visitors. The operators in Yellowstone and Grand Canyon Parks also had printed, for distribution to their employees coming in contact with the public, information manuals prepared by the park naturalists.

In several of the parks the park naturalists met the utility employees at the beginning of the season and outlined information regarding the history and natural features of the park, so that they could more adequately answer inquiries.

The hotel and transportation facilities in Mesa Verde National Park were purchased last spring by the Mesa Verde Park Co., a subsidiary of the Denver & Rio Grande Western Railway. No physical improvements were constructed by the new operator, but a tentative agreement between the company and the Park Service calls for the construction of a modern hotel unit conforming in architecture to the park headquarters development when water has been gained to permit the construction work and the operation of all modern conveniences. Drilling for water is now under way and it is hoped construction may be started next spring. A new site for the hotel unit has already been selected. Greatly improved rail and stage facilities to the park were furnished by the Denver & Rio Grande Western and its new subsidiary. The bus line now operates from the main standard-gage railhead at Grand Junction to the park, thereby eliminating the long roundabout trip on the narrow-gage line from Alamosa to Mancos and shortening the time required to make the trip from Denver by one full day.

The Grand Canyon Lodge development on the north rim of the Grand Canyon was completed by the Utah Parks Co. This lodge, including the housekeeping units, employees' quarters, and other facilities, is the finest tourist development in the national-park system, and one which might well be used as a guide for improvements, other than the luxurious hotel, throughout the parks. The availability of water through the hydroelectric power and pumping plant constructed by the company at Roaring Springs is an outstanding factor in the general development. A comprehensive five-year development program involving an expenditure of approximately \$3,500,000 was submitted by Fred Harvey, the operator on the south rim.

A big new wing was added to the Canyon Hotel in Yellowstone National Park.

The inauguration of passenger airplane service by the Mount McKinley Tourist & Transportation Co. was approved by the National Park Service as an experiment, since this type of travel is especially satisfactory in Alaska.

Paradise Inn, in Mount Rainier National Park, was given a general renovation, and a modern housekeeping-cabin unit was constructed in the public camp ground in Paradise Valley. A beginning was made in the construction of tourist accommodations in the Yakima Park section, soon to be opened to travel, by the establishment of a large service building and 200 housekeeping cabins. This unit will be in readiness to accommodate visitors as soon as the road is opened up.

Special attention was given by the Yosemite Park & Curry Co. to the development of the High Sierra units in Yosemite National Park, which are becoming increasingly popular. This company also devoted considerable attention to the development of winter-sport activities.

While the big tourist development near Moran, Wyo., is not within the Grand Teton National Park, it is proper to mention here that the Teton Lodge and the Jackson Lake Lodge were consolidated under the same management and that the Teton Lodge was very greatly improved through the addition of many new cabins and the installation of hot and cold water systems, a new sewerage system, and a housekeeping unit. Much important landscape work was also accomplished. The Teton Transportation Co., owned by the same group which has been developing these lodges, established a bus line between Victor, Idaho, and Moran, connecting at the latter point with the Yellowstone Park Transportation Co.

COOPERATION FROM FEDERAL, STATE, AND PRIVATE SOURCES

A pleasurable duty in preparing this report is the acknowledgment of the cooperation furnished the National Park Service by other bureaus of the Federal Government and by the various States.

In conformity with its long-established practice, the service continued to call upon scientific and technical bureaus to assist in handling problems within their specialized fields, rather than building up its own corps of assistants along these lines. This policy has been found to be not only economical from the standpoint of expenditure of Federal funds, but also exceedingly satisfactory in national-park administration.

The Bureau of Public Roads of the Department of Agriculture continued to handle the major park-road problems. Assistance in insect control in the park forests was rendered by the Bureau of Entomology of the same department, and the Bureau of Plant Industry and Bureau of Biological Survey also cooperated fully. The Forest Service, as usual, worked closely with the Park Service on mutual problems, and the Weather Bureau furnished its usual cooperation.

The work of the Public Health Service of the Treasury Department in park sanitation and of the Bureau of Fisheries of the Department of Commerce has already been outlined. The Bureau of Mines in the latter department also rendered assistance.

Visitors profited greatly by the excellent service rendered by the Post Office Department in the parks. The Department of Justice continued to maintain commissioner's courts in several parks, to expedite the administration of justice. The General Accounting Office continued its assistance in accounting matters, and the Alaska Road

Commission cooperated in the construction of roads in Mount McKinley Park and in improvements at the Sitka National Monument.

In our own department I wish to express the sincere thanks of my associates and myself to the various officials of the Secretary's office who have so whole-heartedly studied the problems of the service and assisted in their solution. The assistance of the Geological Survey, the General Land Office, and the Indian Service is also appreciated.

Officials and commissions of the various States in which the national parks and national monuments are located aided in stocking park lakes and streams, in work on approach roads, and in many other ways. County and other local officials have also rendered material assistance.

Invaluable aid was rendered along scientific and general educational lines by the Carnegie Institution of Washington and other scientific organizations. The work of the committee on educational matters in the national parks has already been acknowledged.

HAWAII NATIONAL PARK NOW UNDER FEDERAL JURISDICTION

Sole and exclusive jurisdiction over the Hawaii National Park, in the Territory of Hawaii, was provided by the act of Congress approved April 19, 1930. This will greatly simplify the difficulties that have confronted the National Park Service in its administration of the park. Until the passage of this act it was impossible for criminal offenses committed in the national park to be prosecuted by Federal authorities, since Federal jurisdiction in the Territory extended only to offenses against the United States and those committed on land under sole and exclusive jurisdiction of the Federal Government. The proposal to place the park under sole and exclusive jurisdiction of the Federal Government met with the approval of the Governor of Hawaii upon the insertion of the proviso that the Territory would retain the right to tax "all rightful subjects of taxation in respect to said park."

DONATIONS

Again the national park and monument system has benefited greatly through the generosity of many friends in making donations of practical value to the visiting public. The gifts include deeds to privately owned lands; funds to purchase private holdings, museum, and other equipment, and to construct roads, trails, museums, and other buildings; museum exhibits; photographic and other visual education material; and personal services in the form of assisting at the lectures in the parks and in serving in several capacities at the nominal salary of a dollar a month.

It is regretted that space (and often the expressed wish of the donor) will not permit listing here the names of all who have assisted us so enthusiastically in our endeavors to bring the parks and monuments to the high standard that is the ideal of all of us.

To all who have so cooperated grateful acknowledgment is hereby made. Their generosity will benefit both present and future generations of park visitors. It is also a source of encouragement and inspiration to those of us engaged in carrying on the Government's work of administering the parks and monuments.

STATE, COUNTY, AND MUNICIPAL PARK DEVELOPMENT

Closely allied to our national-park work is the development of State, county, and municipal parks throughout the country. It was through the efforts of former Director Stephen T. Mather that the first State park conference was called in Des Moines, Iowa, in 1921. It was his idea that an adequate system of State parks, stretching across the continent, would complement the national parks in forming an unparalleled system of scenic, educational, and recreational areas. The National Conference on State Parks, organized in a preliminary way 10 years ago and later placed on a permanent basis, is now one of the strong forces for scenic conservation in the United States. At the present time there is scarcely a State which is not interested in the State park idea.

The tenth annual meeting of the conference, held at Linville, N. C., June 17 to 20, 1930, brought out clearly the splendid progress made in the State park field during the past year. Associate Director Cammerer represented the National Park Service at the meeting.

The Service is also deeply interested in the development of Nation-owned parks in and around our National Capital. These areas are not under the jurisdiction of the National Park Service, but the director of the Service is *ex officio* a member of the National Capital Park and Planning Commission, to which is intrusted the beautification of Washington.

Especially interesting in this connection was the approval by President Hoover, on May 29, 1930, of H. R. 26, the bill introduced by Representative Cramton, of Michigan, for the acquisition, establishment, and development of the George Washington Memorial Parkway along the Potomac River from Mount Vernon and Fort Washington to Great Falls, and for the acquisition of lands in the District of Columbia and the adjoining States of Maryland and Virginia to form a comprehensive park, parkway, and playground system for the National Capital.

This act provides a practical course by which the Federal Government may carry into effect the recommendations of the National Capital Park and Planning Commission for preserving the natural beauty of Washington and provides for the participation of the District of Columbia and the States of Maryland and Virginia with the Federal Government in purchasing and developing the required areas.

Outstanding in municipal park development was the offer of John D. Rockefeller, jr., to present to the city of New York a 56-acre tract of land in Washington Heights, valued at \$7,000,000, for use as a public park. Included in the gift was Mr. Rockefeller's offer to defray the cost of landscape development of the area, which is estimated at about \$2,000,000.

A four-acre tract within the proposed park area was reserved by Mr. Rockefeller and presented at the same time to the Metropolitan Museum of Art for a new museum building, which he plans to build at a cost of between \$2,000,000 and \$4,000,000.

Particularly gratifying in all this park-development work is the interest taken in it by public-spirited citizens and also by private and public organizations. The Nation is awakening to its responsi-

bility for preserving from its vast, though rapidly disappearing, natural scenic resources representative areas that may serve as breathing spaces for its future citizens.

PARK DEVELOPMENTS ABROAD

The National Park Service has continued to take a keen interest in foreign national-park development, particularly in view of the fact that many foreign countries have appealed to the United States for information to be used in modeling their own park systems upon ours.

In officially inaugurating the work of the commission in charge of the Albert National Park in the Belgian Congo, King Albert of Belgium last fall paid high tribute to the national-park activities of the United States, which, he said had inspired and set an example to all the world in the work of preserving the public domain for future generations. He referred at length to his own visit to several parks of this country. A further study of these areas was made by a member of the Belgian foreign office, with a view to obtaining information which would be helpful in administering the Albert National Park.

A game preserve, to protect elephants, buffalo, antelope, and other native animals, was established in the Oriental Province of the Belgian Congo. It is hoped later to make this a complete nature reserve, administered on the same principle as the Albert Park.

The Dominion Government has continued the development of the Canadian national parks and the reserving of historic sites of national importance. Many people now include in one trip visits to several Dominion and United States national parks. The interesting nature-guide work introduced in the Canadian parks during the past season already has been referred to under the section on educational activities. Along historic lines the recent preservation as a national historic site of the Southwold Earthworks, in Ontario, is interesting. These ruined fortifications are declared by Canadian archeologists and officials of the Smithsonian Institution to be the only existing double-walled Indian fortifications in America. They were built by the Attiwandaronk or Neutral Nation of Indians, who were driven from Ontario by the militant Iroquois about 1650. Canada has a National Parks Association to support the preservation of the national parks.

Interesting from the standpoint of conservation is the Quetico-Superior project, to protect the Rainy Lake watershed by combining the Superior National Forest in Minnesota and the Quetico Provincial Park in Ontario in one vast international wilderness sanctuary. Legislation was enacted at the last session of Congress giving authority to proceed with the working out of the problem in the United States.

In Australia a proposal has been made for the establishment of the New England National Park, on the New England Plateau in the Guy Fawkes region. Proponents of the plan, which is sponsored by the Wild Life Preservation Society of Australia, say that this area comprises some of the grandest and wildest scenery of their country. The State of Queensland has a National Park Association

to advocate extensive national parks there. A very interesting report was received during the year from the Tongariro National Park Board of New Zealand.

England and Scotland are also interested in the national-park idea. There is now a Prime Minister's Committee on National Parks to study the situation and make recommendations. At present the proposal to give the Forest of Dean in England and the Scottish Cairngorms national-park status is under consideration. Other areas that have been suggested are the English Lakes, Dartmoor, the Pembroke Coast, the High Peak, and the South Downs. Again the point has been brought out that to the British mind the word "parks" denotes a more circumscribed area than our national parks and one more highly developed for amusements. The title "national domain" has been suggested, among others, for British parks.

The first annual report on the national parks in Poland was received during the year, and was exceedingly interesting. In mentioning the service rendered in the Tatras reference is made to the motto above the north entrance gate to Yellowstone National Park, "For the benefit and enjoyment of the people." This seems to have been adopted for the Polish parks also. When it was establishing its parks, the Government of Poland requested data and guidance from the United States, and this Service has followed their progress with the keenest interest.

LEGISLATION

The following is a summary of legislation affecting the National Park Service pending or considered in the second session of the Seventy-first Congress:

BILLS ENACTED INTO LAW

The first deficiency act of March 26, 1930 (Public, No. 78), carried appropriations for the National Park Service, as follows:

Crater Lake National Park, insect-control work.....	\$12, 000
Yellowstone National Park, as a reimbursement to appropriations used in administration of the Grand Teton National Park and for expenses paid in connection with the Yellowstone Park Boundary Commission.....	17, 000
George Washington Birthplace National Monument, Wakefield, Va., \$15,000 for moving to a new site the monument marking the place where George Washington was born, and \$50,000 for payment to the Wakefield Memorial Association for use in restoring the house and grounds of the birthplace.....	65, 000
Emergency reconstruction and fighting forest fires.....	180, 000

This act also authorized the use of \$4,500 of the 1930 appropriation for Bryce Canyon National Park for the completion of a superintendent's residence at Zion National Park.

The Interior Department appropriation act for the fiscal year ending June 30, 1931 (Public, No. 217, approved May 14, 1930), carried appropriations of \$9,889,135 for the National Park Service in Washington and for the administration, protection, maintenance, and improvement of the various parks and monuments, as well as for the construction of roads and trails therein. Included in this

sum was \$1,750,000 for the acquisition of privately owned lands in the national parks, which was necessary to complete the purchase of valuable timberlands in Yosemite National Park. This act also carried authority for the entering into of contracts in the amount of \$2,500,000 for roads and trails in the parks and monuments prior to appropriation of the money, in addition to an appropriation of \$5,000,000 for such work. Other important items of the act are: Authority for attendance of employees of the Service at meetings concerned with their work, and authority for the employment of specialists and experts for examinations and investigations of lands to determine their suitability for national park and national monument purposes. Necessary funds for the examination of proposed park areas were provided. Of the unexpended balance of appropriations made for the acquisition of privately owned lands, \$200,000 was made available for payment in full of the purchase price of any of these lands, to be matched by subsequent donations.

The second deficiency act of July 3, 1930 (Public, No. 519) carried the following items for the parks and monuments administered by the National Park Service:

Great Smoky Mountains National Park, administration and protection of portion of area recently conveyed to the United States by North Carolina and Tennessee-----	\$30,000
Yosemite National Park, for electric energy purchased during the 1930 fiscal year-----	5,381
George Washington Birthplace National Monument, an additional amount for removing the monument marking the birthplace of Washington to a new site-----	15,000

It also made available until June 30, 1931, the unexpended balance of an appropriation of \$10,350 for one-third of the cost of construction of a telephone line partly outside Glacier National Park carried in the 1930 appropriation act.

S. 195, to facilitate administration of the national parks, provided authorizations in law, the need for which had been definitely felt in a proper administration of the national parks and monuments. (Public, No. 255, approved May 26, 1930.)

S. 428, authorized the Navy Department to transfer the Seawall Naval Radio Station, consisting of 229 acres, to the Interior Department as an addition to Acadia National Park. (Public, No. 248, approved May 23, 1930.)

S. 1183, authorized the sale of a small tract of land on the border of Hot Springs National Park to the Connelly Paving Co. (Private Law No. 123, approved June 25, 1930.)

S. 1784, established the George Washington Birthplace National Monument, Wakefield, Va. (Public, No. 34, approved January 23, 1930.)

S. 3531, authorizing the Department of Agriculture to enlarge tree-planting operations on the national forests, provided that the National Park Service may secure from that department young trees, etc., for reforestation work in the national parks. (Public, No. 319, approved June 9, 1930.)

S. 4169, added 17,900 acres of land to Zion National Park. (Public, No. 351, approved June 13, 1930.)

S. 4170, authorized the addition of 42,240 acres to Bryce Canyon National Park by executive proclamation. (Public, No. 352, approved June 13, 1930.)

S. 4085, authorized the Indian Service to use a right of way for an irrigation ditch through the Casa Grande Ruins National Monument. (Public, No. 350, approved June 13, 1930.)

S. J. Res. 155, changed the name of Copper Mountain in Mount McKinley National Park to Mount Eielson. (Public Resolution No. 87, approved June 14, 1930.)

S. Res. 252, authorized the Committee on Public Lands and Surveys to study the advisability of establishing additional national parks. (Agreed to May 5, 1930.)

H. R. 1058, to reimburse Jesse A. Frost for the loss of personal effects by fire while he was serving as a ranger at Grand Canyon National Park. (Private, No. 191, approved June 28, 1930.)

H. R. 3568, removed a proviso carried in the act of March 1, 1929, revising the boundaries of Yellowstone National Park. (Public, No. 147, approved April 19, 1930.)

H. R. 4020, authorized an investigation as to the advisability and practicability of establishing a national park along the Mississippi River in the States of Iowa, Illinois, Wisconsin, and Minnesota, to be known as the Upper Mississippi National Park. (Public, No. 358, approved June 14, 1930.)

H. R. 5672, abolished the Papago Saguaro National Monument, providing for disposition of the lands therein to the State of Arizona for park and rifle-range purposes and to the town of Tempe for park purposes. (Public, No. 92, approved April 7, 1930.)

H. R. 6121, authorized the maintenance of central warehouses in the national parks and monuments. (Public, No. 145, approved April 18, 1930.)

H. R. 5619, authorized the exchange of 10 acres of land in Lassen Volcanic National Park for a like amount of land outside the park. (Public, No. 148, approved April 19, 1930.)

H. R. 6343, extended the eastern boundary limits of the proposed Great Smoky Mountains National Park so as to take in approximately 14,000 acres of fine timber land. (Public, No. 154, approved April 19, 1930.)

H. R. 6874, authorized exchanges of public lands for lands in private ownership within the Petrified Forest National Monument. (Public, No. 215, approved May 14, 1930.)

H. R. 8763, authorized an investigation of the Apostle Islands, in Lake Superior, and report to Congress as to the advisability and practicability of establishing them as a national park. (Public, No. 186, approved May 9, 1930.)

H. R. 9183, provided for the exercise of exclusive jurisdiction by the United States over Hawaii National Park. (Public, No. 157, approved April 19, 1930.)

H. R. 9895, established Carlsbad Caverns National Park, formerly a national monument. (Public, No. 216, approved May 14, 1930.)

H. R. 10581, authorized the addition to Yosemite National Park, by executive proclamation, of 960 acres of land in the Mather Station section. (Public, No. 187, approved May 9, 1930.)

H. R. 11784, authorized the addition of approximately 22,544 acres of land to Rocky Mountain National Park by executive proclamation. (Public, No. 404, approved June 21, 1930.)

H. R. 12235, provided for creation of the Colonial National Monument, taking in historical areas in and around Yorktown, Williamsburg, and Jamestown Island, Va. (Public, No. 510, approved July 3, 1930.)

H. R. 10582, provided for addition of 5,160 acres of land to Lassen Volcanic National Park by executive proclamation. (Public, No. 507, approved July 3, 1930.)

OTHER MEASURES INTRODUCED OR PENDING IN THE SECOND SESSION OF THE SEVENTY-FIRST CONGRESS WHICH FAILED OF ENACTMENT

S. 43, to provide for payment by the United States of a judgment recovered by George Snyder against W. W. Payne for an act he committed in his official capacity while superintendent of Glacier National Park.

S. 45, for the relief of L. M. Winzenburg for injuries received by stepping into a hot pool in Yellowstone National Park.

S. 104 and H. R. 151, authorizing an appropriation of \$1,943,200 for construction of a highway from Red Lodge, Mont., to the boundaries of Yellowstone National Park near Cooke City, Mont.

S. 196, to provide for uniform administration of national parks, by repealing various laws affecting the parks which have been found repugnant to the purposes for which these areas were established.

S. 326, to establish the Royal Gorge National Park, Colo.

S. 1494 and H. R. 3867, to establish the Ouachita National Park, Ark.

S. 1896, providing that William Gladstone Steel, United States commissioner for Crater Lake National Park, shall be paid from the time of his separation from the service until the time of his death a monthly sum equal to the pay per month he is now receiving.

S. 2318, to establish the Grand Coulee National Park, Wash.

S. 2798 and H. R. 7740, to authorize the Department to permit J. B. Wofford to excavate for buried treasure alleged to be in Gran Quivira National Monument, and to which he holds a deed.

S. 3049 and H. R. 10294, to authorize the States of Montana, Idaho, and Wyoming to tax persons and corporations, their franchises and property, within that portion of Yellowstone National Park lying within the boundary lines of the respective States.

S. 3146 and H. R. 9051, to provide for Federal aid in the establishment of State parks.

S. 3073, H. R. 8000, and H. R. 12404, to provide for national park approach roads.

S. J. Res. 191 and H. J. Res. 374, authorizing an appropriation for erecting a memorial to the pioneers who crossed the Great Smoky Mountains and for building a memorial highway from the entrance of the Great Smoky Mountains National Park to the city of Knoxville, Tenn.

H. R. 235, to establish the Roosevelt National Park, N. Dak.

H. R. 239, to establish the Killdeer Mountain National Park, N. Dak.

H. R. 1531, to pay Margaret Constable the sum of \$10,000 for injuries received when attacked by a bear in Yellowstone National Park.

H. R. 2374, to add approximately 4,080 acres of land to Sequoia National Park.

H. R. 3126, to establish for the purposes of administration of the employees' compensation act that Mrs. Leola Snyder was entirely dependent upon her son at the time of his accidental death while in the employ of the Government at Yellowstone National Park.

H. R. 3572, to establish the Homestead National Park, in Nebraska, as a memorial to the homestead law.

H. R. 3590, to establish a national park in Texas.

H. R. 3658, to establish the Fort Boonesboro National Monument, Ky., as a memorial to the pioneer settlers of the West.

H. R. 4021, accepting the cession by the State of Montana of concurrent police jurisdiction over the rights of way of the Blackfeet Highway and its connections with the Glacier National Park road system on the Blackfeet Indian Reservation.

H. R. 5055, to authorize building of roads in Craters of the Moon National Monument.

H. R. 7339, to reimburse H. H. Lee for property lost in a forest fire in Glacier National Park.

H. R. 8145, and H. R. 11900, to authorize an investigation of the Menominee Indian Reservation to determine the advisability and practicability of establishing a national park.

H. R. 8183, to reimburse T. J. Allen, jr., superintendent of Hawaii National Park for damage to his personal belongings by vandals.

H. R. 8283, to change the status of Platt National Park to that of a national monument.

H. R. 8284, to abolish Platt National Park and to turn the lands therein over to the State of Oklahoma for State park purposes.

H. R. 8534, to abolish Sullys Hill National Park and to transfer the lands therein to the Department of Agriculture for administration as a game preserve.

H. R. 9498, to provide for creation of the Saratoga National Monument in the State of New York.

H. R. 10557, authorizing the use of funds appropriated for roads and trails in the national parks for payment of part of the cost of paving Whittington Avenue in Hot Springs, Ark.

H. R. 10576, authorizing exchange of public lands for privately owned lands in Chaco Canyon National Monument.

H. R. 10584, to authorize restoration of natural landscape conditions in Glacier National Park.

H. R. 11582, to provide for monuments to mark the birthplaces of deceased Presidents of the United States.

H. R. 12381, to provide for establishment of the Tropic Everglades National Park, Fla.

H. R. 12666, to provide for purchase of the home of President McKinley in Buffalo, N. Y.

H. R. 12903, to provide for removal of the Otter Cliffs Radio Station to a site within Acadia National Park.

H. R. 13190, to establish the Wichita Mountains National Park of Oklahoma.

H. R. 13249, to authorize the acceptance by the Secretary of the Interior of a tract of land adjoining Hot Springs National Park.

PRESIDENTIAL PROCLAMATIONS

On April 14, 1930, the President issued a proclamation adding 7,725.19 acres to Yosemite National Park.

On July 9, 1930, the President by proclamation added 37 acres to the Craters of the Moon National Monument.

On July 17, 1930, the President signed a proclamation adding approximately 14,144 acres of land to the Rocky Mountain National Park.

EXECUTIVE ORDERS

October 3, 1929, 128.01 acres were temporarily withdrawn for classification pending determination as to the advisability of adding the area to the Hovenweep National Monument, Colo.

February 7, 1930, 3,440 acres were temporarily withdrawn pending determination as to the advisability of adding same to Zion National Park.

February 7, 1930, three townships in New Mexico were temporarily withdrawn pending determination as to the advisability of including them in a national monument.

April 25, 1930, 4,212 square miles of land in Arizona and Nevada, adjoining the lake which will be formed by the Hoover Dam, were withdrawn pending determination as to their recreational possibilities and with a view to including the same in a national monument.

June 17, 1930, 34,560 acres were temporarily withdrawn in aid of classification with a view to adding such lands to the Carlsbad Caverns National Park.

July 25, 1930, approximately 2,000,000 acres in Death Valley, California, were temporarily reserved pending determination as to the advisability of including a portion of it in a national monument.

INDIVIDUAL PARK REPORTS IN APPENDIX D

It has not been practicable, in this brief report, to touch upon all phases of park activity of interest to the public. Rather, I have endeavored to stress only the outstanding administrative problems and the major developments, leaving to the various field officers the task of reporting in detail upon their respective charges. The individual reports of the park superintendents, the superintendent of southwestern monuments, the custodians of certain other monuments, and the chiefs of the technical and special divisions, are printed in Appendix D.

It should be explained that the acting superintendent of Sullys Hill National Park, whose report is included in Appendix D, is superintendent of the Fort Totten Indian School and serves in his park capacity only through the courtesy of the Indian Service and without cost to the National Park Service. No funds for the administration of this little park have ever been available for expenditure by the National Park Service, all Government improvements there having been made by the Bureau of Biological Survey, as it is in a game preserve administered by that bureau. I again wish to reiterate strongly the fact that the designation of this area as a park is a misnomer, and to recommend vigorously its change in status from

national park to game preserve. A bill to turn this area over to the Bureau of Biological Survey is now pending in Congress, and I trust it may receive favorable consideration during the next session.

CONCLUSION

It gives me great pleasure, in concluding this report of the activities of the National Park Service, to stress the fact that it has been a year of successful accomplishments.

The reallocation of the Service as one of the most important bureaus of the Department of the Interior, the enlargement of personnel and expansion of quarters, including the establishment of a new branch of education and research, and progress in the field along all lines of construction and other endeavor, are all achievements that will make for better service to the public in the future. And that is the only criterion by which the worth of the bureau may be judged.

The big disappointment of the year was the inability of President Hoover, due to a great national emergency, to carry out his plans to visit one or more of the national parks. Such a visit would have been the crowning success of an altogether successful year.

No report would be complete without a public acknowledgment of the cooperation and splendid work of all branches of the Service. Despite expansion in personnel, many of our officers and employees still labor long and cheerfully under unusually heavy burdens, and they deserve the highest praise.

I was particularly pleased with the well-uniformed, fine type of men encountered in the national parks. They displayed uniform courtesy, kindness, and a spirit of service to the public that has evoked the admiration and respect of visitors.

It is with pride in our personnel and pleasure in our 1929-30 achievements that I respectfully submit this report to you.

HORACE M. ALBRIGHT, *Director*.

APPENDIX A

ORGANIZATION OF THE NATIONAL PARK SERVICE

(Department of the Interior, Washington, D. C.)

Horace M. Albright, director.
Arno B. Cammerer, associate director.
A. E. Demaray, senior assistant director, in charge branch of operations.
W. B. Lewis, assistant director, in charge branch of lands. (Died August 26, 1930.)
Harold C. Bryant, assistant director, in charge branch of education.
G. A. Moskey, assistant to the director, in charge branch of use, law, and regulation.
Charles L. Gable, chief auditor, in charge park operators' accounts.
R. M. Holmes, chief clerk.
Noble J. Wilt, chief accountant.
Charles R. Brill, chief, mails and files.
Isabelle F. Story, editor, in charge division of publications.

FIELD SERVICE

CIVIL ENGINEERING DIVISION

(409 Underwood Building, San Francisco, Calif.)

Frank A. Kittredge, chief engineer.

LANDSCAPE ARCHITECTURAL DIVISION

(409 Underwood Building, San Francisco, Calif.)

Thomas C. Vint, chief landscape architect.

FIELD EDUCATIONAL AND FORESTRY HEADQUARTERS

(213 Hilgard Hall, University of California, Berkeley, Calif.)

Ansel F. Hall, senior park naturalist and forester.

THE NATIONAL PARKS

Acadia, George B. Dorr, superintendent, Bar Harbor, Me.

Bryce Canyon, Eivind T. Scoyen, superintendent, Zion National Park, Utah.

Carlsbad Caverns, Thomas Boles, superintendent, Carlsbad, N. Mex.

Crater Lake, Elbert C. Solinsky, superintendent, Crater Lake, Oreg.

General Grant, John R. White, superintendent, Sequoia National Park, Calif.

Glacier, J. Ross Eakin, superintendent, Belton, Mont.

Grand Canyon, M. R. Tillotson, superintendent, Grand Canyon, Ariz.

Grand Teton, Samuel T. Woodring, superintendent, Stewart Ranger Station,

Moose, Teton County, Wyo.

Great Smoky Mountains (proposed), superintendent not yet appointed.

Hawaii, Thomas J. Allen, jr., superintendent, Hawaii National Park, Hawaii.

Hot Springs, Dr. Hugh de Valin, superintendent, Hot Springs National Park, Ark.

Lassen Volcanic, Lynn W. Collins, superintendent, Mineral, Calif.

Mesa Verde, Jesse L. Nusbaum, superintendent, Mancos, Colo.

Mount McKinley, Harry J. Liek, superintendent, McKinley Park, Alaska.

Mount Rainier, Owen A. Tomlinson, superintendent, Longmire, Wash.

Platt, William E. Branch, superintendent, Sulphur, Okla.

Rocky Mountain, Edmund B. Rogers, superintendent, Estes Park, Colo.

Sequoia, John R. White, superintendent, Sequoia National Park, Calif.

Sullys Hill, O. C. Gray, acting superintendent, Fort Totten, N. Dak.

Wind Cave, Anton J. Snyder, superintendent, Hot Springs, S. Dak.

Yellowstone, Roger W. Toll, superintendent, Yellowstone Park, Wyo.

Yosemite, Charles G. Thomson, superintendent, Yosemite National Park, Calif.

Zion, Eivind T. Scoyen, superintendent, Zion National Park, Utah.

THE NATIONAL MONUMENTS

Aztec Ruins, Johnwill Faris, custodian, Aztec, N. Mex.

Capulin Mountain, Homer J. Farr, custodian, Capulin, N. Mex.

Casa Grande, Frank Pinkley,¹ superintendent, Coolidge, Ariz.

Chaco Canyon, Hilding Palmer, custodian, Crownpoint, N. Mex.

Craters of the Moon, R. B. Moore, custodian, Arco, Idaho.

Devils Tower, John M. Thorn, custodian, Hulett, Wyo.

El Morro, Evon Z. Vogt, custodian, Ramah, N. Mex.

George Washington Birthplace, Oliver G. Taylor, engineer in charge, National Park Service, Washington, D. C.

Gran Quivira, W. H. Smith, custodian, Gran Quivira, N. Mex.

Montezuma Castle, Martin L. Jackson, custodian, Camp Verde, Ariz.

Muir Woods, J. Barton Herschler, custodian, Mill Valley, Calif.

Natural Bridges, Zeke Johnson, custodian, Blanding, Utah.

¹As superintendent of southwestern monuments, Mr. Pinkley is in charge of all monuments in New Mexico, Arizona, Colorado, and Utah, with the exception of the Dinosaur and Colorado National Monuments. His headquarters are at Coolidge, Ariz.

Navajo, John Wetherill, custodian, Kayenta, Ariz.
 Petrified Forest, Charles J. Smith, custodian, Holbrook, Ariz.
 Pinnacles, W. I. Hawkins, custodian, Hollister, Calif.
 Pipe Spring, Charles Leonard Heaton, custodian, Moccasin, Ariz.
 Scotts Bluff, A. N. Mathers, custodian, Gering, Nebr.
 Sitka, Peter Trierschild, custodian, Sitka, Alaska.
 Tumacacori, George L. Boundey, custodian, Tubac, Ariz.
 Verendrye, Adolph Larsen, custodian, Sanish, N. Dak.
 Wupatki, J. C. Clarke, custodian, Flagstaff, Ariz.

NOTE

The following national monuments have no local custodians:

Arches (Utah).	Katmai (Alaska).
Colorado (Colorado).	Lewis and Clark Cavern (Montana).
Dinosaur (Utah).	Rainbow Bridge (Utah).
Glacier Bay (Alaska).	Shoshone Cavern (Wyoming).
Fossil Cycad (South Dakota).	Yucca House (Colorado).
Hovenweep (Utah-Colorado).	

APPENDIX B

NATIONAL PARKS AND NATIONAL MONUMENTS ADMINISTERED BY VARIOUS FEDERAL DEPARTMENTS

NATIONAL PARKS TABLE 1.—*National parks administered by the National Park Service, Department of the Interior*

[Number, 23; total area, 12,431.63 square miles or 7,956,038.67 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area, square miles	Area, acres	Private lands, acres	Special characteristics
Acadia 1, 1919	Maine coast	Mount Desert Ferry, Me. Central system.	Feb. 26, 1919 Jan. 19, 1920 ² May 23, 1930 ²	40 Stat. 1178. 45 Stat. 1083. Pub. 248, 71st Cong.	16.72	10,693.50		The group of granite mountains upon Mount Desert Island and also bold point on opposite mainland across Frenchmans Bay; formerly called the Lafayette National Park.
Bryce Canyon 1, 1923	Southwestern Utah.	Cedar City, Union Pacific system, Marysville, D. & R. G. W.	June 7, 1924 Feb. 25, 1928 ² May 12, 1928 Sept. 15, 1928 ³ June 13, 1930 May 14, 1930	43 Stat. 593. 45 Stat. 147. 45 Stat. 502. Became a park. Pub. 352, 71st Cong. Pub. 216, 71st Cong.	22.60 1.12	14,480.00 719.22		Box canyon filled with countless array of fantastically eroded pinnacles; best exhibit of vivid coloring of earth's materials.
Carlsbad Caverns 1, 1930	Southeastern New Mexico.	Carlsbad, Santa Fe system. Van Horn, Tex., & Pac., El Paso, Alamogordo, and Carrizozo, Southern Pacific.	May 22, 1902	32 Stat. 202	249.00	159,360.00	1,946.27	Contains stupendous caverns, not yet wholly explored, with magnificent limestone decorations.
Crater Lake 1, 1902	Southwestern Oregon.	Medford or Klamath Falls, Southern Pacific, Chiloquin Great Northern and Southern Pacific.	Oct. 1, 1890	26 Stat. 650	4.00	2,536.00	158.70	Lake of extraordinary blue in crater of extinct volcano; sides 1,000 feet high; interesting lava formations; fine fishing.
General Grant 1, 1890	Middle eastern California.	Fresno, Sanger, or Visalia, Santa Fe and Southern Pacific.						Created to preserve the celebrated General Grant Tree, 40.3 feet in diameter; 31 miles by trail from Sequoia National Park.

Glacier ¹ 1910	Northwestern Montana.	Glacier Park Station and Belton, Great Northern.	May 11, 1910	36 Stat. 354.	1, 534. 00	981, 681. 00	19, 026. 27	Rugged mountain region of unsurpassed alpine character; 250 glacier fed lakes of romantic beauty; 60 small glaciers, precipices thousands of feet deep; almost sensational scenery of marked individuality; fine trout fishing.
Grand Canyon ¹ 1919	North central Arizona.	Grand Canyon Station, Santa Fe system, North Rim motor stage from Cedar City, Utah, Union Pacific; or from Marysvale, Utah, Denver & Rio Grande Western.	Feb. 26, 1919 Feb. 25, 1927; Mar. 7, 1928; ²	40 Stat. 1175 44 Stat. 1238 45 Stat. 200-234.	1, 003. 00	645, 808. 79	2, 452. 16	The greatest example of erosion and the most sublime spectacle in the world.
Grand Teton ¹ 1929	Northwestern Wyoming.	Victor, Idaho, Oregon Short Line.	Feb. 26, 1929	45 Stat. 1314.	150. 00	96, 000. 00	1, 122. 04	Includes most spectacular portion of Teton Mountains, an uplift of unusual grandeur.
Great Smoky Mountains (proposed). 1930	North Carolina and Tennessee.	Maryville, Knoxville & Augusta R. R. (Tenn.). Bryson, Southern R. R. (N. C.).	Aug. 28, 1930	-----	248. 22	158, 876. 50	-----	This area is not to be developed as a national park until at least 427,000 acres have been donated to the United States, as specified in the organic act. Meanwhile the park area of 158,876.50 acres already in Federal ownership is being protected by the National Park Service.
Hawaii ¹ 1916	Hawaii.	Interisland steamers from Honolulu.	Aug. 1, 1916 May 1, 1922; ² Feb. 12, 1927; ² Apr. 11, 1928; ²	39 Stat. 432. 42 Stat. 503. 45 Stat. 424. 44 Stat. 1087.	245. 00	156, 800. 00	22. 00	Interesting volcanic areas—Kilauea and Mauna Loa, active volcanoes on the island of Hawaii; Halekale, a huge extinct volcano on the island of Maui.
Hot Springs ¹ 1921	Middle Arkansas.	Hot Springs, Rock Island & Missouri Pacific systems.	Mar. 4, 1921; ⁴	41 Stat. 1407.	1. 50	927. 00	-----	46 hot springs said to possess healing properties; many hotels and boarding houses; 19 bathhouses under Government supervision. Reserved by Congress in 1832 as the Hot Springs Reservation to prevent exploitation of hot waters.
Lassen Volcanic ¹ 1916	Northern California.	Red Bluff, Southern Pacific; Paxton, Western Pacific; Susanville, Southern Pacific.	Aug. 9, 1916 Apr. 26, 1928; ² May 21, 1928; ² Jan. 19, 1929; ² Apr. 19, 1930; ² July 3, 1930; ²	39 Stat. 442. 45 Stat. 466. 45 Stat. 644. 45 Stat. 1081. Public 148, 71st Cong. Public 507, 71st Cong.	163. 30	104, 526. 61	3, 266. 40	Only active volcano in United States proper; Lassen Peak 10,453 feet; cinder cone, 6,913 feet; hot springs, mud geysers.

¹ General information circulars on these parks may be obtained free on application.² Boundary changed.³ Date acquisition private land as provided by act of June 7, 1924.⁴ Established as a reservation Apr. 20, 1832.

NATIONAL PARKS TABLE 1.—*National parks administered by the National Park Service, Department of the Interior*—Continued.

[Number, 23; total area, 12,431.63 square miles or 7,956,038.67 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area, square miles	Area, acres	Private lands, acres	Special characteristics
Mesa Verde ¹ 1906	Southwestern Colorado.	Manitou, Denver and Rio Grande Western.	June 29, 1906 June 30, 1913 ²	34 Stat. 616. 38 Stat. 82, 83, 84.	80.11	51,273.42	790.00	Most notable and best preserved prehistoric cliff dwellings in United States if not in the world.
Mount McKinley ¹ 1917	South central Alaska.	McKinley Park Station, United States Alaska Railroad.	Feb. 26, 1917 Jan. 30, 1922 ²	39 Stat. 938. 42 Stat. 339.	2,645.00	1,692,800.00	-----	Highest mountain in North America; rises higher above surrounding country than any other mountain in the world.
Mount Rainier ¹ 1899	West central Washington.	Ashford, Chicago, Milwaukee, St. Paul and Pacific.	Mar. 2, 1899 May 28, 1926 ²	30 Stat. 993. 44 Stat. 608.	325.00	207,752.00	485.59	Largest accessible single peak glacier system; 28 glaciers, some of large size; 48 square miles of glacier; 50 to 500 feet thick; wonderful subalpine wildflower fields.
Platt ¹ 1902	Southern Oklahoma.	Sulphur, Santa Fe system and Frisco lines.	July 1, 1902 Apr. 21, 1904 ²	32 Stat. 641, 655. 33 Stat. 220.	1.30	848.31	-----	Sulphur and other springs said to possess healing properties.
Rocky Mountain ¹ 1915	North middle Colorado.	Longmont, Burlington Route and Colorado & Southern; Loveland, Colorado & Southern; Lyons, Burlington Route; Boulder, Denver Interurban and Colorado & Southern; Fort Collins, Union Pacific and Colorado & Southern; Granby, Denver & Salt Lake.	Jan. 26, 1915 Feb. 14, 1917 ² June 2, 1924 ² June 9, 1928 ² June 21, 1930 ²	38 Stat. 798. 39 Stat. 916. 43 Stat. 252. 44 Stat. 712. Public 404,71st Cong.	400.52	256,336.00	8,090.87	Heart of the Rockies; snowy range, peaks 11,000 to 14,235 feet altitude; remarkable records of glacial period.
Sequoia ¹ 1890	Middle eastern California.	Exeter or Visalia, Santa Fe and Southern Pacific.	Sept. 25, 1890 Oct. 1, 1890 July 3, 1928 ²	26 Stat. 478. 26 Stat. 650. 44 Stat. (Pt. 2) 818.	604.00	386,560.00	1,971.22	The Big Tree National Park; scores of sequoias 20 to 30 feet in diameter, thousands over 10 feet in diameter; General Sherman Tree, 37.3 feet in diameter and 273.9 feet high; towering mountain ranges; startling precipices; Mount Whitney and Kern River country.
Sullys Hill ¹ 1904	North Dakota	Devils Lake, Great Northern, and Soo Line.	Apr. 27, 1904	33 Stat. 322, 323, 2368.	1.20	780.00	-----	Small park with woods, streams, and a lake; is a wild-animal preserve.

Wind Cave ¹ ----- 1903	South Dakota-----	Hot Springs, Burlington Route and Chicago & North Western.	Jan. 9, 1903	32 Stat. 765.	17. 00	10, 899. 00	-----	Cavern, having several miles of galleries and numerous chambers containing peculiar formations.
Yellowstone ¹ ----- 1872	North western Wyoming, south- western Mon- tana and north- eastern Idaho.	Gardiner, Mont., North- ern Pacific; West Yel- lowstone, Mont., Union Pacific; Cody, Wyo., Burlington Route; Lan- der, Wyo., Chicago & North Western; Three Forks, Mont., Chicago, Milwaukee, St. Paul and Pacific.	Mar. 1, 1872 Mar. 1, 1929 ²	17 Stat. 32, 33 45 Stat. 1435.	\$3, 426. 00	2, 192, 640. 00	7, 188. 00	More geysers than in all rest of world together; boiling springs; mud volcanoes; petrified forests; Grand Canyon of the Yellow- stone, remarkable for gorgeous coloring; large lakes; many large streams and waterfalls; vast wilderness, one of the greatest wild-bird and animal preserves in the world; exceptional trout fishing.
Yosemite ¹ ----- 1890	Middle eastern California.	Merced, Southern Pacific and Santa Fe; thence Yosemite Valley Rail- road to El Portal.	Oct. 1, 1890 Feb. 7, 1905 June 11, 1906 May 28, 1928 ² Mar. 2, 1929 ² May 9, 1930 ² Nov. 19, 1919 June 13, 1930 ²	26 Stat. 650. 33 Stat. 702. 34 Stat. 831. 45 Stat. 787. 45 Stat. 1486. Public 187, 71st Cong. 41 Stat. 356. Public 351, 71st Cong.	1, 138. 78	728, 823. 59	5, 033. 52	Valley of world-famed beauty; lofty cliffs; romantic vistas; many waterfalls of extraordinary height; 3 groves of Big Trees; High Sierra, Waterwheel Falls; good trout fishing.
Zion ¹ ----- 1919	South western Utah.	Cedar City, Union Pacific system; Marysvale, D. & R., G. W.			148. 26	94, 887. 73	1, 251. 87	Magnificent gorge (Zion Canyon); depth from 1,500 to 2,500 feet, with precipitous walls; of great beauty and scenic interest.

¹ General information circulars on these parks may be obtained free on application.

² Boundary changed.

³ In Wyoming, 3,145 square miles; in Montana, 245 square miles; in Idaho, 36 square miles.

NATIONAL PARKS TABLE 2.—*National monuments administered by the National Park Service, Department of the Interior*

[Number, 32; total area, 3,724.03 square miles or 2,383,467.88 acres]

Name	Location	Approaches	When established	Statute reference	Area, acres	Private lands, acres	Special characteristics
Arches.....	Utah.....	Thompson, Rio Grande Western-U. S. 450 to monument.	Apr. 12, 1929	Proc. 1875.....	4,520.00	320.00	Contains extraordinary examples of wind erosion in the shape of gigantic arches, windows, and other unique formations.
Aztec Ruins ¹	New Mexico.....	Aztec, D. & R. G. W.....	Jan. 24, 1923 July 2, 1928 ; Aug. 9, 1916	42 Stat. 2295..... 45 Stat. 2954. 39 Stat. 1792.....	17.40 680.37	-----	Prehistoric ruin of pueblo type containing 500 rooms and other ruins. Cinder cone of geologically recent formation.
Capulin Mountain.....	do.....	Folsom, Colorado & Southern.	Mar. 2, 1889 June 22, 1892 ; Dec. 10, 1909 Aug. 3, 1918	25 Stat. 961..... Executive order. 36 Stat. 2504. 40 Stat. 1818.	472.50	-----	These ruins are one of the most noteworthy relics of a prehistoric age and people within the limits of the United States. Discovered in ruinous condition in 1694.
Casa Grande.....	Arizona.....	Florence, Southern Pacific.	June 7, 1926 ; Mar. 11, 1907 Jan. 10, 1928 ;	44 Stat. 698. 35 Stat. 2119..... 45 Stat. 2937.	4 21, 512.37	10, 266.24	Numerous cliff-dweller ruins, including communal houses, in good condition and but little excavated.
Chaco Canyon.....	New Mexico.....	Thoreau, Santa Fe system.	May 24, 1911	37 Stat. 1681.....	13, 749.47	-----	Many lofty monoliths; is wonderful example of erosion, and of great scenic beauty and interest.
Colorado.....	Colorado.....	Grand Junction, Denver & Rio Grande Western.	May 2, 1924 July 23, 1928 ; July 9, 1930 ; Sept. 24, 1906	43 Stat. 1947..... 45 Stat. 2959. Proc. 1916. 34 Stat. 3236.....	49, 601.90 1, 152.91	1, 579.96	Best example of fissure lava flows; volcanic region with weird landscape effects.
Craters of the Moon.....	Idaho.....	Arco, Oregon Short Line.....	Oct. 4, 1915	39 Stat. 1752.....	80.00	-----	Remarkable natural rock tower, of volcanic origin, 1,200 feet in height. Deposits of fossil remains of prehistoric animal life of great scientific interest.
Devils Tower.....	Wyoming.....	Moorcroft, Burlington route.	Dec. 8, 1906 June 18, 1917 ;	34 Stat. 3264..... 40 Stat. 1673.	240.00	-----	Enormous sandstone rock eroded in form of a castle, upon which inscriptions have been placed by early Spanish explorers. Contains cliff-dweller ruins. Of great historic, scenic, and ethnologic interest.
Dinosaur.....	Utah.....	Watson, Uintah Ry.....	Oct. 21, 1922	42 Stat. 2286.....	320.00	-----	Area containing deposits of plant fossils.
El Morro.....	New Mexico.....	Gallup or Grant, Santa Fe system.	Jan. 25, 1930	Pub. No. 34, 71st Cong.	21.73	-----	Site of home in which George Washington was born to be rehabilitated and replica of the old homestead to be erected.
Fossil Cycad.....	South Dakota.....	Minnekahta, C. B. & Q.....					
George Washington Birthplace.....	Virginia.....	Fredericksburg, Richmond, Fredericksburg & Potomac, thence State route No. 37 to monument.					

Grant	State	Location	System	Date	Stat.	Cost	Remarks
Gran Quivira	New Mexico	Mountainair, Santa Fe system.	Fe	Nov. 1, 1909 Nov. 25, 1919 ¹	36 Stat. 2503. 41 Stat. 1778.	423.77	One of the most important of earliest Spanish mission ruins in the Southwest. Monument also contains pueblo ruins.
Hovenweep	Utah and Colorado.	Mancos, D. & R. G. W.	W	Mar. 2, 1923	42 Stat. 2299.	285.80	Four groups of prehistoric towers, pueblos, and cliff dwellings.
Katmai	Alaska	Sailing vessel from Kodiak, reached by steamship from Seattle.	Fe	Sept. 24, 1918 Sept. 5, 1923	40 Stat. 1855. Executive Order No. 3897.	1,087,990.00	Wonderland of great scientific interest in the study of volcanism. Phenomena exist upon a scale of great magnitude. Includes Valley of Ten Thousand Smokes.
Lewis and Clark Cavern. ¹	Montana	Temporarily closed to public.	Fe	May 11, 1908 May 16, 1911	35 Stat. 2187. 37 Stat. 1679.	160.00	Immense limestone cavern of great scientific interest, magnificently decorated with stalactite formations. Now closed to public because of depredations by vandals.
Montezuma Castle	Arizona	Clarkdale, Santa Fe system.	Fe	Dec. 8, 1906	34 Stat. 3265.	4 160.00	Prehistoric cliff-dwelling ruin of unusual size situated in a niche in face of a vertical cliff. Of scenic and ethnologic interest.
Muir Woods ¹	California	Ferry from San Francisco, thence Mount Tamalpais & Muir Woods R. R.	Fe	Jan. 9, 1908 Sept. 22, 1921 ²	35 Stat. 2174. 42 Stat. 2249.	426.43	One of the most noted redwood groves in California, and was donated by the late Hon. William Kent, ex-Member of Congress. Located 7 miles from San Francisco.
Natural Bridges	Utah	Pack trip from Blanding, Utah, reached by stage from Thompson, Utah, Mancos, Colo., stations on Denver & Rio Grande Western.	Fe	Apr. 16, 1908 Sept. 25, 1909 Feb. 11, 1916	35 Stat. 2183. 36 Stat. 2502. 39 Stat. 1764.	4 2,740.00	Three natural bridges, among largest examples of their kind. Largest bridge is 222 feet high, 65 feet thick at top of arch; arch is 28 feet wide; span, 261 feet; height of span, 157 feet. Other two slightly smaller.
Navajo	Arizona	Gallup, N. Mex. or Flagstaff, Ariz., Santa Fe system.	Fe	Mar. 20, 1909 Mar. 14, 1912	36 Stat. 2491. 37 Stat. 1733.	360.00	Contains numerous pueblo, or cliff-dweller ruins, in good preservation.
Petrified Forest	do.	Adamana or Holbrook, Santa Fe system.	Fe	Dec. 8, 1906 July 31, 1911 ²	34 Stat. 3266. 37 Stat. 1716.	25,908.40	Abundance of petrified coniferous trees, one of which forms a small natural bridge. Is of great scientific interest.
Pinnacles	California	Soledad or Hollister, Southern Pacific.	Fe	Jan. 16, 1908 May 7, 1923 ² July 2, 1924 ²	35 Stat. 2177. 43 Stat. 1911. 43 Stat. 1961.	2,980.26	Many spirelike rock formations, 600 to 1,000 feet high, visible, many miles; also numerous caves and other formations.
Pipe Spring	Arizona	Cedar City, Utah, Union Pacific.	Fe	May 31, 1923	43 Stat. 1913.	40.00	Old stone fort and spring of pure water in desert region. Serves as memorial to early western pioneer life.

¹ Donated to United States.² Boundary changed.³ From June 22, 1892, until August 3, 1918, classified as a national park.⁴ Estimated.

NATIONAL PARKS TABLE 2.—*National monuments administered by the National Park Service, Department of the Interior—Continued*

[Number, 32; total area, 3,724.03 square miles or 2,383,467.88 acres]

Name	Location	Approaches	When established	Statute reference	Area, acres	Private lands, acres	Special characteristics
Rainbow Bridge.....	Utah.....	Pack trip from Navajo Mountain, Ariz., reached from Gallup, N. Mex., or Flagstaff, Ariz., Santa Fe system.	May 30, 1910	36 Stat. 2703.....	160.00	-----	Unique natural bridge of great scientific interest and symmetry. Height 309 feet above water, and span is 278 feet, in shape of rainbow.
Scotts Bluff.....	Nebraska.....	Gering, Union Pacific.....	Dec. 12, 1919 May 9, 1924 ²	41 Stat. 1779..... Executive order No. 4008.	1,893.83	129.70	Region of historic and scientific interest. Many famous old trails traversed by the early pioneers in the winning of the West passed over and through this monument. Cavern of considerable extent, near Cody, not open to visitors at present.
Shoshone Cavern.....	Wyoming.....	Cody, Burlington route.....	Sept. 21, 1909	36 Stat. 2501.....	210.00	-----	Area of great natural beauty and historic interest as scene of massacre of Russians by Indians. Contains 16 totem poles of best native workmanship.
Sitka.....	Alaska.....	Port of call for steamships from Seattle.	Mar. 23, 1910	36 Stat. 2601.....	57.00	-----	Ruin of Franciscan mission dating from seventeenth century. Being restored by National Park Service as rapidly as funds permit.
Tumacacori.....	Arizona.....	Calabasas, Southern Pacific, and El Paso & Southern.	Sept. 15, 1908	35 Stat. 2205.....	10.00	-----	Includes Crowhigh Butte, from which Explorer Verendrye first beheld territory beyond the Missouri River.
Verendrye.....	North Dakota.....	Sanish, Soo Line.....	June 29, 1917	40 Stat. 1677.....	250.04	-----	Prehistoric dwellings of ancestors of Hopi Indians.
Wupatki.....	Arizona.....	Flagstaff, Santa Fe system.....	Dec. 9, 1924	43 Stat. 1977.....	2,234.10	320.00	Located on eastern slope of Sleeping Ute Mountain. Is pile of masonry of great archeological value, relic of prehistoric inhabitants.
Yucca House ¹	Colorado.....	Mancoas, Denver & Rio Grande Western.	Dec. 19, 1919	41 Stat. 1781.....	9.60	-----	

¹ Donated to United States.

² Boundary changed.

[Number, 32; total area, 596.22 square miles or 381,185 acres]

Name	Location	Approaches	When established	Statute reference	Area, acres	Special characteristics
Bandelier	New Mexico	Santa Fe, Santa Fe system, and Denver & Rio Grande Western.	Feb. 11, 1916	39 Stat. 1764	22, 075	Vast number of cliff-dweller ruins of unusual ethnological and educational interest, including ruins of Rito de los Frijoles, Otowi, Tsankawi, and others. Some of the tools, implements, and simple household equipment of the former inhabitants have been restored as they were centuries ago.
Chiricahua	Arizona	Wilcox, Southern Pacific	Apr. 18, 1924	43 Stat. 1946	4, 480	Natural rock formations—pillars, balanced rocks, and formations resembling animals, faces, etc.
Devils Postpile	California	Laws, Southern Pacific, thence stage to Mammoth.	July 6, 1911	37 Stat. 1715	800	Consists of peculiar hexagonal basaltic columns, like an immense pile of posts. The columns lie in the pile at all angles from vertical to almost horizontal. Said to rank with famous Giant's Causeway of Ireland.
Gila Cliff Dwellings	New Mexico	Silver City, via Pinos Altos, Santa Fe system.	Nov. 16, 1907	35 Stat. 2162	160	Cliff-dweller ruins. Four natural cavities in the face of an overhanging cliff 150 feet high, of a grayish-yellow volcanic formation, are divided into small rooms by walls built of adobe and small stones, which are in a good state of preservation. The ruins are situated in rough and broken country and are accessible only by trail.
Holy Cross	Colorado	Redcliff, Denver & Rio Grande	May 11, 1929	Proc. 1877	1, 392	2 crevices on side of Mount of the Holy Cross, which when filled, or partially filled, with snow form a figure in the shape of a Greek cross.
Jewel Cave	South Dakota	Custer, Burlington route	Feb. 7, 1908	35 Stat. 2180	1, 280	Object of much public and religious interest. Cavern of limestone formation. Consists of a series of chambers, connected by narrow passages, with numerous side galleries.
Lava Beds	California	Mount Hebron, Southern Pacific	Nov. 21, 1925	44 Stat. 2591	45, 967	Unusual and unique exhibits of volcanic action and lava flows in the shape of peculiar lava caves and tunnels in great numbers and of considerable size. In many of these caves rivers of perpetual ice are found and Indian petroglyphs carved and painted upon their walls indicate possible occupancy by early historic and prehistoric races. Battle ground of Modoc Indian war of 1873.
Lehman Caves	Nevada	Ely, Nevada Northern	Jan. 24, 1922	42 Stat. 2260	593	Caves of light-gray and white limestone, honey-combed by tunnels and galleries of stalactite formations.

1 Estimated.

NATIONAL PARKS TABLE 3.—*National monuments administered by the Department of Agriculture*—Continued
 [Number, 16; total area, 596.22 square miles or 381,185 acres]

Name	Location	Approaches	When established	Statute reference	Area, acres	Special characteristics
Mount Olympus.....	Washington.....	Port Angeles by ferry from Seattle.	Mar. 2, 1909 Apr. 17, 1912 May 11, 1915	35 Stat. 2247..... 37 Stat. 1737. 39 Stat. 1726.	298, 730	Contains many objects of unusual scientific interest, including numerous glaciers. It is a real wilderness area, having no settlements, no supply points, nor human habitations within it. Bands of the rare Roosevelt elk, numbering several thousand head, of a species native to the region and not found elsewhere, have their summer feeding grounds within the monument area.
Old Kasaan.....	Alaska.....	Steamships, Seattle to Ketchikan...	Oct. 25, 1916	39 Stat. 1812.....	38	Abandoned Haida Indian village in which remain totem poles, grave houses and monuments, and portions of the original framework of the buildings.
Oregon Caves.....	Oregon.....	Grants Pass, Southern Pacific.....	July 12, 1909	36 Stat. 2497.....	480	Caves in limestone formation of great variety and beauty. These assume odd, grotesque, and fantastic forms of considerable extent and are situated in an attractive environment.
Sunset Crater.....	Arizona.....	Flagstaff, Santa Fe system.....	May 26, 1930	Proc. No. 1911.....	3, 040	A volcanic crater with lava flows and ice caves, near famous San Francisco Peaks.
Timpanogos Cave.....	Utah.....	American Fork, Union Pacific system; D. & R. G. W.	Oct. 14, 1922	42 Stat. 2285.....	250	Limestone cavern. The cave is almost 600 feet in length. Many beautiful effects are emphasized by the electric lights installed in the cave.
Tonto.....	Arizona.....	Globe, Southern Pacific.....	Dec. 19, 1907	35 Stat. 2168.....	1 640	Two cliff-dweller ruins just off the Roosevelt Globe Highway, one to the southwest of the road and the other on the west side of the canyon. They consist of two and three storied walls of adobe with the supporting beams and lintels of windows and low doors still in place.
Walnut Canyon.....	do.....	Flagstaff, Santa Fe system.....	Nov. 30, 1915	39 Stat. 1761.....	960	Contains cliff dwellings of marked scientific and popular interest built in under the outward sloping canyon walls, utilizing the projecting limestone ledges as foundations. Instead of being of the communal type, these cliff houses were apparently built for separate families and contain from six to eight rooms.
Wheeler.....	Colorado.....	Wagon Wheel Gap or Creede, Denver & Rio Grande Western.	Dec. 7, 1908	35 Stat. 2214.....	300	Volcanic formations of unusual scientific interest as illustrating erratic erosion. Unusual combination of fantastic pinnacles and interesting gorges.

[Number, 16; total area, 642.31 acres]

REPORT OF DIRECTOR OF NATIONAL PARK SERVICE

61

Name	Location	Approaches	When established	Statute reference	Area, acres	Special characteristics
Abraham Lincoln's Birthplace	Kentucky	Hodgenville, Illinois Central	July 17, 1916	39 Stat. 385	110.50	Contains the log cabin and part of the farm where Abraham Lincoln was born.
Big Hole Battlefield	Montana	Divide, Union Pacific	June 23, 1910	Ex. Order	5.00	Site of battleflood on which battle was fought Aug. 9, 1877, between a small force of United States troops and a much larger force of Nez Perce Indians, resulting in rout for the Indians.
Cabrillo	California	San Diego, Southern Pacific and Santa Fe system.	Oct. 14, 1913 May 12, 1926	38 Stat. 1965 44 Stat. 2612	.50	Of historic interest because of discovery of the territory now partly embraced in the State of California by Juan Rodriguez Cabrillo, who at this point first sighted land on Sept. 28, 1542.
Castle Pinckney	South Carolina	Charleston, A. C. L., S. A. L., Southern	Oct. 15, 1924	43 Stat. 1968	3.50	Fortification built in 1810 to replace a revolutionary fort.
Chalmette	Louisiana	New Orleans, N. O. & N. E., Louisville & Nashville.	Mar. 4, 1907	34 Stat. 1411	17.47	Erected in memory of the battle of New Orleans, which was fought on Jan. 8, 1815.
Fort Marion	Florida	St. Augustine, Florida E. C.	Oct. 15, 1924	43 Stat. 1968	18.09	Fort built by Spaniards in 1656.
Fort Matanzas	do	do	do	do	1.00	Relic of Spanish invasion.
Fort McHenry	Maryland	Baltimore; Philadelphia, Baltimore, and Washington.	Mar. 3, 1925	43 Stat. 1109	46.75	Restored and preserved as birthplace of "Star Spangled Banner."
Fort Niagara	New York	Lewiston, New York Central	Sept. 5, 1925	44 Stat. 2582	.0074	Site for erection of cross to commemorate a cross erected by Father Millett in 1688 on what is now the Fort Niagara Military Reservation.
Fort Pulaski	Georgia	Pulaski, Central of Georgia	Oct. 15, 1924	43 Stat. 1968	20.00	Built in 1810 to replace Fort Greene of the Revolution.
Fort Wood	New York	New York City	do	do	2.50	Site of the Statue of Liberty.
Kenesaw Mountain	Georgia	Marietta, via Nashville, Chattanooga, and St. Louis.	Feb. 15, 1928	do	60.00	Site of important Civil War engagement fought June 27, 1864.
Kitty Hawk	North Carolina	Elizabeth City, Eastern N. R. Line.	Mar. 2, 1927	44 Stat. 1264	None.	Scene of first sustained flight by heavier-than-air machine.
Meriwether Lewis	Tennessee	Hohenwald, N. C. & St. L.	Feb. 6, 1925	43 Stat. 1986	300.00	Contains grave of Captain Lewis of the Lewis and Clark Expedition.
Mound City Group	Ohio	Chillicothe, B. & O. and N. & W.	Mar. 2, 1923	42 Stat. 2298	57.00	Famous group of prehistoric mounds in Camp Sherman Military Reservation.
White Plains Battlefield	New York	White Plains, New York Central	May 18, 1926	44 Stat. 562	None.	Memorial tablet to indicate the position of the Revolutionary Army under the command of General Washington.

NATIONAL PARKS TABLE 5.—*National military and other parks administered by the War Department*

[Number, 11; total area, 22 square miles or 14,131.86 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area, acres	Special characteristics
Antietam Battlefield.....	Maryland.....	Antietam, Norfolk & Western.....	Aug. 30, 1890	26 Stat. 401.....	40.00	Scene of one of the greatest battles of the Civil War.
Chickamauga and Chattanooga.....	Georgia and Tennessee.....	Chattanooga, several southern roads.	Aug. 19, 1890 Mar. 3, 1891	26 Stat. 333..... 26 Stat. 978.....	6,541.64	Beautiful natural park; embraces battlefields of Chickamauga and Missionary Ridge and scenes of other conflicts of the Civil War fought in the vicinity of Chattanooga during 1863.
Fredericksburg and Spotsylvania.....	Virginia.....	Fredericksburg, R., F. & P.....	Feb. 14, 1927	44 Stat. 1091.....	None.	Scene of battles of Fredericksburg, Spotsylvania, Wilderness, Chancellorsville, and Salem Church at or near Fredericksburg.
Fort Donelson Gettysburg ¹	Tennessee..... Pennsylvania.....	Erin, Louisville & Nashville..... Gettysburg, Philadelphia & Reading, and Western Maryland.	Mar. 26, 1928 Feb. 11, 1895	45 Stat. 367..... 28 Stat. 651.....	None. 2,316.86	Site of Civil War fort; now military cemetery. Beautiful natural park; scene of Civil War combat; probably better marked than any other battlefield in the world.
Gullford Courthouse.....	North Carolina.....	Greensboro, Southern and Atlantic & Yadkin.	Mar. 2, 1917	39 Stat. 996.....	110.46	Near Greensboro; scene of one of the great battles of the Revolution; fought in 1781.
Moore's Creek.....	do.....	Burgaw, A. C. Line.....	June 2, 1926	44 Stat. 684.....	30.00	Scene of one of most memorable battles of Revolutionary War.
Petersburg.....	Virginia.....	Petersburg, Seaboard Air Line, and Atlantic Coast Line, and N. & W.	July 3, 1926	44 Stat. 822.....	185.00	Scene of campaign and siege and defense of Petersburg, Virginia, in 1864 and 1865.
Shiloh.....	Tennessee.....	Corinth, Miss., Illinois Central and Southern.	Dec. 27, 1894	28 Stat. 597.....	3,583.69	Natural park embracing the battlefield of Shiloh near Pittsburg Landing.
Stones River.....	do.....	Murfreesboro, Nashville, Chattanooga & St. Louis.	Mar. 3, 1927	44 Stat. 1399.....	None.	Scene of the battle of Stones River in Tennessee.
Vicksburg.....	Mississippi.....	Vicksburg, Alabama & Vicksburg, Shreveport & Pacific, and Yazoo & Mississippi Valley.	Feb. 21, 1899	30 Stat. 841.....	1,324.21	Beautiful natural park; scene of the siege and surrender of Vicksburg in 1863 during the Civil War.

¹ Donated in whole or in part to the United States.

APPENDIX C

TRAVEL AND FISCAL STATISTICS

NATIONAL PARKS TABLE 6.—*Visitors to the national parks, 1915-1930*

Name of park	1915	1916	1917	1918	1919	1920	1921	1922
Acadia ¹					² 64,000	² 66,500	² 69,836	73,779
Crater Lake	11,371	12,265	11,645	13,231	16,645	20,135	28,617	33,016
General Grant	10,523	15,360	17,390	15,496	21,574	19,661	30,312	50,456
Glacier	14,265	12,839	18,387	9,086	18,956	22,449	19,736	23,935
Grand Canyon					37,745	67,315	67,485	84,700
Hawaii		(³)	(³)	(³)	(³)	(³)	² 16,071	27,750
Hot Springs	² 115,000	² 118,740	² 135,000	² 140,000	² 160,490	² 162,850	² 130,968	² 106,164
Lassen Volcanic		(³)	² 8,500	² 2,000	² 2,500	² 2,000	² 10,000	² 10,000
Mesa Verde	663	1,385	2,223	2,058	2,287	2,890	3,003	4,251
Mount McKinley			(³)	(³)	(³)	(³)	(³)	² 7
Mount Rainier	35,166	23,989	35,568	43,901	55,232	56,491	55,771	70,371
Platt	² 20,000	² 30,000	² 35,000	14,431	26,312	27,023	² 60,000	² 70,000
Rocky Mountain	² 31,000	² 51,000	117,186	101,497	169,492	240,966	² 273,737	² 219,164
Sequoia	7,647	10,780	18,510	15,001	30,443	31,508	28,263	27,514
Sullys Hill	² 1,000	² 1,500	2,207	4,188	4,026	9,341	9,100	² 9,548
Wind Cave	2,817	² 9,000	16,742	² 36,000	² 25,000	² 38,000	28,336	31,016
Yellowstone	51,895	35,849	35,400	21,275	62,261	79,777	81,651	98,223
Yosemite	33,452	33,390	34,510	33,497	58,362	68,906	91,513	100,506
Zion						3,692	2,937	4,109
Total	334,799	356,097	488,268	451,661	755,325	919,504	1,007,335	1,044,502

Name of park	1923	1924	1925	1926	1927	1928	1929	1930
Acadia ¹	64,200	71,758	73,673	101,256	123,699	134,897	149,554	154,734
Bryce Canyon							21,997	35,982
Carlsbad Caverns ⁴								90,104
Crater Lake	52,017	64,312	65,018	86,019	82,354	113,323	128,435	157,693
General Grant	46,230	35,020	40,517	50,597	47,996	51,988	44,783	43,547
Glacier	3,988	33,372	40,063	37,325	41,745	53,454	70,742	73,776
Grand Canyon	102,166	108,256	134,053	140,252	162,356	167,226	184,093	172,763
Grand Teton							² 51,500	² 60,000
Hawaii	41,150	52,110	64,155	² 35,000	37,551	78,414	109,857	89,578
Hot Springs	² 112,000	² 164,175	² 265,500	² 260,000	² 181,523	² 199,099	184,517	167,062
Lassen Volcanic	² 9,500	² 12,500	² 12,956	18,739	20,089	26,057	26,106	31,755
Mesa Verde	5,236	7,109	9,043	11,356	11,915	16,760	14,517	16,656
Mount McKinley	² 34	² 62	² 206	² 533	² 651	² 802	1,038	951
Mount Rainier	123,708	161,473	173,004	161,796	200,051	219,531	217,783	265,620
Platt	² 117,710	² 134,874	² 143,380	² 124,284	² 294,954	² 280,638	² 204,598	² 178,188
Rocky Mountain	218,000	224,211	233,912	² 225,027	² 229,862	² 235,057	² 274,408	255,874
Sequoia	30,158	34,468	46,677	89,404	100,684	98,035	111,385	129,221
Sullys Hill	8,478	8,035	9,183	19,921	22,632	24,979	21,004	21,293
Wind Cave	41,505	52,166	69,267	85,466	81,023	100,309	108,943	88,000
Yellowstone	138,352	144,153	154,282	187,807	200,825	230,984	260,697	227,901
Yosemite	130,046	105,894	209,166	274,209	490,430	460,619	461,257	458,566
Zion	6,408	8,400	16,817	21,964	24,303	30,016	33,383	55,297
Total	1,280,886	1,422,353	1,760,512	1,930,865	2,354,643	2,522,188	2,680,597	2,774,561

¹ Formerly Lafayette National Park.

² Estimated.

³ No record.

⁴ Indicated loss in travel from 1921 due largely to better methods of checking and estimating employed.

⁵ Actual park visitors; some miners and prospectors also passed through park.

⁶ National park established by act of May 14, 1930. Formerly a national monument.

NATIONAL PARKS TABLE 7.—Visitors to the national monuments, 1925-1930

Name	1925	1926	1927	1928	1929	1930
Arches (Utah)-----					² 500	² 40
Aztec Ruins (New Mexico)-----	² 7, 000	5, 646	7, 298	18, 359	18, 193	12, 90
Capulin Mountain (New Mexico)-----	² 7, 000	14, 965	12, 617	² 7, 600	² 12, 000	² 16, 50
Carlsbad Cave (New Mexico)-----	1, 794	10, 904	26, 436	46, 335	76, 822	(²)
Casa Grande (Arizona)-----	13, 587	16, 542	28, 818	28, 274	37, 244	36, 63
Chaco Canyon (New Mexico)-----	² 2, 000	2, 500	² 1, 500	1, 425	² 2, 750	² 2, 30
Colorado (Colorado)-----	² 9, 000	² 9, 000	² 9, 500	² 10, 000	² 12, 000	² 13, 00
Craters of the Moon (Idaho)-----	3, 349	4, 620	5, 771	7, 768	7, 730	7, 30
Devils Tower (Wyoming)-----	8, 450	16, 640	² 10, 400	² 8, 000	² 12, 000	14, 75
El Morro (New Mexico)-----	² 1, 800	5, 794	5, 178	5, 356	2, 625	² 3, 50
George Washington Birthplace (Virginia)-----						² 10, 00
Gran Quivira (New Mexico)-----	² 1, 000	1, 577	2, 034	2, 779	3, 357	4, 83
Hovenweep (Utah-Colorado)-----	² 250	² 250	263	² 240	² 450	² 40
Montezuma Castle (Arizona)-----	² 9, 000	12, 385	15, 400	16, 232	17, 824	19, 23
Muir Woods (California)-----	93, 643	97, 426	101, 514	103, 571	93, 358	77, 33
Natural Bridges (Utah)-----		68	82	175	² 260	² 30
Navajo (Arizona)-----	200	² 250	² 260	315	965	23
Papago Saguaro (Arizona)-----	² 30, 000	² 53, 000	60, 540	66, 450	² 87, 600	² 450, 00
Petrified Forest (Arizona)-----	55, 227	53, 345	61, 761	75, 225	69, 350	105, 43
Pinnacles (California)-----	² 10, 000	10, 167	11, 265	13, 216	10, 756	11, 80
Pipe Spring (Arizona)-----	² 4, 000	16, 728	16, 853	17, 321	24, 883	8, 70
Rainbow Bridge (Utah)-----	250	² 300	² 300	² 200	² 450	33
Scotts Bluff (Nebraska)-----	² 24, 000	² 27, 000	² 30, 000	² 37, 500	² 42, 500	² 48, 50
Shoshone Cavern (Wyoming)-----				² 300		
Sitka (Alaska)-----		² 2, 500	² 3, 000	² 3, 000	² 3, 500	² 3, 00
Tumacacori (Arizona)-----	² 10, 500	13, 683	16, 761	17, 341	18, 250	15, 00
Verendrye (North Dakota)-----	² 1, 400	² 8, 000	² 15, 000	² 15, 000	² 11, 500	² 8, 00
Wupatki (Arizona)-----	² 500	² 600	² 450	² 500	² 550	65
Yucca House (Colorado)-----	² 100	² 150	196	174	² 250	² 20
Total-----	294, 050	384, 040	443, 197	502, 656	567, 667	472, 05

¹ No records for other national monuments.² Estimated.³ Made a national park by act of Congress approved May 14, 1930.⁴ National monument status of Papago Saguaro abolished by act of Congress approved Apr. 7, 1930.NATIONAL PARKS TABLE 8.—Private automobiles entering the national parks during seasons 1923-1930¹

Name of park	1923	1924	1925	1926	1927	1928	1929	1930
Acadia ^{2 3} -----	8, 600	12, 561	9, 381	15, 361	29, 181	31, 998	35, 972	37, 100
Bryce Canyon-----							5, 223	10, 000
Carlsbad Caverns ⁷ -----								28, 800
Crater Lake-----	15, 377	19, 301	19, 451	26, 442	25, 667	34, 869	39, 043	51, 000
General Grant-----	12, 036	9, 118	11, 108	12, 869	13, 172	14, 681	12, 995	13, 900
Glacier-----	5, 599	6, 756	7, 585	6, 727	7, 980	9, 860	14, 320	18, 300
Grand Canyon-----	11, 731	13, 052	19, 910	22, 849	28, 479	32, 316	37, 848	39, 500
Grand Teton-----							⁴ 16, 200	⁴ 20, 000
Hawaii ² -----	8, 025	10, 150	12, 650	⁴ 6, 500	8, 345	14, 505	18, 347	28, 200
Hot Springs ² -----					⁵ 1, 559	⁵ 1, 455	28, 290	25, 400
Lassen Volcanic ² -----			2, 646	5, 423	5, 899	8, 137	8, 370	9, 800
Mesa Verde-----	1, 255	1, 803	2, 197	3, 054	3, 315	4, 803	4, 224	5, 000
Mount Rainier-----	27, 655	38, 351	39, 860	38, 626	48, 275	50, 005	51, 998	62, 800
Platt ² -----	⁴ 50, 000	⁴ 57, 400	⁴ 60, 000	45, 796	⁴ 75, 000	⁴ 70, 000	⁴ 65, 000	⁴ 71, 500
Rocky Mountain ² -----	⁴ 51, 800	⁴ 53, 696	⁴ 58, 057	⁴ 50, 407	⁴ 54, 109	⁴ 57, 381	67, 682	73, 100
Sequoia ⁶ -----	9, 796	11, 032	14, 273	26, 503	30, 165	29, 290	33, 250	39, 600
Sullys Hill ² -----			2, 271	4, 484	⁴ 4, 700	5, 229	4, 936	4, 200
Wind Cave ² -----	13, 570	17, 200	22, 598	28, 332	26, 879	33, 300	36, 317	⁴ 20, 000
Yellowstone-----	27, 359	30, 689	33, 068	⁵ 44, 326	49, 055	58, 186	68, 415	63, 500
Yosemite-----	27, 233	32, 814	49, 229	74, 885	137, 296	131, 689	132, 903	141, 200
Zion-----	1, 446	1, 993	3, 928	4, 796	6, 203	7, 532	8, 612	15, 600
Total-----	271, 482	315, 916	368, 212	417, 386	557, 079	595, 236	689, 945	779, 200

¹ Automobiles entering parks with or without licenses, to and including Sept. 30, 1928.² No license required.³ Formerly Lafayette National Park.⁴ Estimated.⁵ Count made only at public camp ground.⁶ License required only for Giant Forest Road.⁷ National park established by act of May 14, 1930. Formerly a national monument.

NATIONAL PARKS TABLE 9.—*Automobile and motor-cycle licenses issued during seasons 1926-1930*

Name of park ¹	1926		1927		1928		1929		1930	
	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles
Crater Lake.....	23,249	35	15,046	18	27,898	46	23,954	46	37,595	10
General Grant.....	4,880	-----	6,702	-----	6,380	-----	6,028	-----	7,199	-----
Glacier.....	5,240	-----	5,196	-----	7,350	5	7,577	-----	10,498	7
Grand Canyon.....	9,707	-----	21,629	-----	26,429	-----	29,229	-----	33,780	-----
Mesa Verde.....	3,222	3	2,959	7	4,256	13	3,926	9	4,599	-----
Mount Rainier.....	20,490	101	28,340	47	32,885	33	32,184	61	35,498	28
Sequoia ²	10,781	-----	16,383	-----	16,599	-----	16,799	-----	20,998	-----
Yellowstone.....	38,942	135	43,062	191	54,139	179	50,150	159	63,853	187
Yosemite.....	29,302	82	96,580	218	75,213	183	74,229	167	81,365	186
Zion.....	3,596	-----	4,069	481	6,107	-----	6,822	-----	10,284	-----
Total.....	149,109	356	239,966	262	257,256	459	256,898	442	305,669	418

¹ No licenses required for Wind Cave, Hot Springs, Platt, Hawaii, Lassen Volcanic, Sullys Hill, Rocky Mountain, Mount McKinley, and Acadia National Parks.

² License required only for Giant Forest Road.

Licenses not required in certain parks because of small road mileage or unimproved condition of roads (see footnote 1). Licenses also not required for travel on unimproved roads in other parks. No charge for license issued for operating cars on official business.

NATIONAL PARKS TABLE 10.—*Receipts collected from automobiles and motor cycles during seasons 1926-1930*

Name of park ¹	1926 ²	1927	1928	1929	1930
Crater Lake.....	\$26,594.50	\$15,064.00	\$27,944.00	\$24,000.00	\$37,623.00
General Grant.....	2,440.00	3,351.00	3,190.00	3,014.00	3,599.50
Glacier.....	5,240.00	5,196.00	7,355.00	7,577.00	10,506.00
Grand Canyon.....	9,707.00	21,629.00	26,429.00	29,300.00	33,988.00
Mesa Verde.....	3,377.00	2,965.50	4,269.00	3,944.00	4,644.00
Mount Rainier.....	21,488.00	28,387.00	32,918.00	32,245.00	35,526.00
Sequoia ³	10,481.00	16,383.00	16,599.00	16,799.00	20,998.00
Yellowstone.....	119,286.50	129,377.00	162,596.00	168,608.00	192,218.00
Yosemite.....	75,179.00	192,370.00	150,609.00	148,613.00	162,784.00
Zion.....	1,798.00	2,034.50	3,053.50	3,431.50	7,521.00
Total.....	275,591.00	416,757.00	434,962.50	437,531.50	509,407.50

¹ No licenses required for Wind Cave, Hot Springs, Platt, Hawaii, Lassen Volcanic, Sullys Hill, Rocky Mountain, Mount McKinley, and Acadia National Parks.

² Rates reduced in 1926.

³ License required only for Giant Forest Road.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917-1930,¹ inclusive; also appropriations for the fiscal year 1931*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Acadia (formerly Lafayette):				
1919.....	\$10,000.00	\$9,972.42		
1920.....	10,000.00	9,930.06		
1921.....	20,000.00	19,997.73		
1922.....	25,000.00	24,992.99		
1923.....	25,000.00	24,819.20		
1924.....	30,000.00	29,785.89		
1925.....	34,700.00	37,258.20		
1925 (deficiency).....	2,820.00			
1926.....	34,190.00	33,636.66		
1927.....	34,000.00	33,614.22		
1928.....	37,940.00	37,376.99		
1929.....	39,000.00	40,014.00		
1929 (deficiency).....	1,355.00			
1930.....	52,600.00	48,701.52		
1931.....	59,900.00			
Bryce Canyon:				
1930.....	26,100.00	21,580.01		
1931.....	13,700.00			
Crater Lake:				
1917.....	8,000.00	7,999.88	\$4,565.25	
1918.....	15,000.00	14,738.44	5,505.72	
1919.....	13,225.00	13,203.84	5,958.21	(³)
1920.....	28,225.00	28,162.05	8,327.73	
1921.....	25,300.00	25,223.40	9,784.98	
1922.....	25,300.00	25,290.41	15,277.53	
1923.....	32,000.00	31,787.77	18,139.75	
1924.....	35,000.00	34,822.56	30,495.93	
1925.....	30,700.00	32,613.36	39,789.49	
1925 (deficiency).....	1,980.00			
1926.....	35,980.00	35,865.26	41,486.50	
1927.....	37,160.00	36,733.05	20,232.00	
1928.....	63,590.00	62,382.53	22,927.69	
1929.....	47,100.00	61,464.00	24,318.22	
1929 (deficiency).....	850.00			
1930.....	59,800.00	67,938.75	38,023.70	
1930 (deficiency).....	12,000.00			
1931.....	73,300.00			
General Grant:				
1917.....	2,000.00	1,999.55	1,153.78	\$536.97
1918.....	2,000.00	1,999.97	1,801.63	3,951.88
1919.....	4,500.00	4,481.51	1,063.90	(³)
1920.....	6,000.00	5,992.79	1,870.83	
1921.....	5,300.00	5,300.00	2,663.37	
1922.....	6,000.00	5,981.24	3,480.45	
1923.....	6,500.00	6,419.88	3,180.16	
1924.....	50,000.00	49,874.91	4,847.73	
1925.....	14,175.00	15,151.51	2,907.54	
1925 (deficiency).....	1,180.00			
1926.....	12,180.00	11,986.37	3,298.55	
1927.....	12,300.00	12,299.73	3,686.63	
1928.....	13,650.00	13,529.26	3,488.90	
1929.....	15,650.00	15,802.00	3,305.70	
1929 (deficiency).....	500.00			
1930.....	15,650.00	15,448.14	3,868.28	
1931.....	15,860.00			
Glacier:				
1917.....	110,000.00	108,148.16	3,202.40	1,352.75
1918.....	150,000.00	114,362.82	4,438.22	9,026.86
1919.....	80,000.00	79,958.69	2,624.53	(³)
1920.....	85,800.00	85,000.00	7,253.85	
1920 (deficiency).....	81,849.12	81,572.94		
1921.....	95,000.00	107,847.30	10,513.20	
1921 (deficiency).....	12,564.09			
1922.....	195,000.00	194,803.03	6,082.71	
1923.....	178,700.00	178,515.70	10,732.67	
1924.....	225,000.00	227,133.13	19,759.23	
1925.....	281,000.00	288,233.45	15,328.71	
1925 (deficiency).....	9,260.00			
1926.....	184,960.00	172,888.11	21,311.72	
1927.....	167,745.00	165,392.38	12,020.58	
1928.....	163,300.00	162,525.28	14,652.59	

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917-1930,¹ inclusive; also appropriations for the fiscal year 1931—Continued.*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Glacier—Continued.				
1929.....	\$188,200.00	} \$191,061.00	\$18,436.18	-----
1929 (deficiency).....	5,065.00			
1930.....	219,400.00			
1931.....	227,000.00			
1930-31 (deficiency).....	9,550.00			
Great Smoky Mountains: 1930-31 (deficiency).....	30,000.00			
Grand Canyon:				
1919.....			525.03	(³)
1920.....	40,000.00	39,874.27	399.32	-----
1921.....	60,000.00	59,948.45	8,305.43	-----
1922.....	100,000.00	99,966.55	4,872.02	-----
1923.....	75,000.00	73,906.35	7,508.72	-----
1924.....	125,400.00	\$ 124,798.40	12,655.42	-----
1925 (without year).....	100,000.00	63,757.24		-----
1925.....	116,000.00	} 115,908.64	12,550.06	-----
1925 (deficiency).....	4,360.00			
1926.....	192,360.00	189,579.00	15,806.45	-----
1927.....	132,000.00	127,097.12	41,300.12	-----
1928.....	128,760.00	128,268.33	46,097.43	-----
1929.....	169,000.00	} \$ 151,813.00	49,078.33	-----
1929 (deficiency).....	3,540.00			
1930.....	145,000.00			
1931.....	153,600.00			
Grand Teton:				
1929.....			25.00	-----
1930.....			70.00	-----
1931.....	30,700.00			-----
Hawaii:				
1919.....	750.00	731.40		-----
1920.....	750.00	747.52		-----
1921.....	1,000.00	125.00		-----
1922.....	10,000.00	9,645.16		-----
1923.....	10,000.00	9,969.03	775.00	-----
1924.....	10,000.00	9,658.74	1,460.00	-----
1925.....	10,000.00	} 9,463.09	760.00	-----
1925 (deficiency).....	1,260.00			
1926.....	15,560.00	13,349.54	2,450.00	-----
1927.....	18,000.00	17,765.44	1,975.00	-----
1928.....	18,250.00	18,119.10	1,450.00	-----
1929.....	21,500.00	} \$ 21,070.00	1,477.00	-----
1929 (deficiency).....	785.00			
1930.....	27,400.00			
1931.....	35,800.00			
Hot Springs:				
1917.....			35,611.75	\$31,302.98
1918.....			28,883.44	42,822.02
1919.....	\$ 140,000.00	140,000.00	52,109.15	32,130.36
1920.....			45,682.85	35,710.33
1921 (deficiency).....	60,000.00	60,000.00	57,807.00	74,021.19
1922.....			55,339.15	85,043.85
1923.....	63,900.00	63,289.88	56,669.16	(³)
1924.....	67,600.00	67,294.82	44,769.53	-----
1925.....	78,000.00	} \$ 85,541.38	\$ 60,577.70	-----
1925 (deficiency).....	11,800.00			
1926.....	72,100.00	69,537.19	\$ 55,421.75	-----
1927.....	71,000.00	69,767.10	47,535.70	-----
1928.....	69,800.00	67,443.19	47,695.50	-----
1929.....	68,000.00	} \$ 71,970.00	47,930.90	-----
1929 (deficiency).....	6,320.00			
1930.....	70,900.00			
1931.....	218,500.00			
Lassen Volcanic:				
1917.....			81.25	(³)
1918.....			118.05	-----
1921.....	2,500.00	2,410.90		-----
1922.....	3,000.00	2,922.41		-----
1923.....	3,000.00	2,963.42	228.66	-----
1924.....	3,000.00	2,865.61	277.27	-----
1925.....	3,000.00	} 2,957.51	170.96	-----
1925 (deficiency).....	100.00			
1926.....	10,000.00			
		9,783.06	135.97	-----

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917–1930,¹ inclusive; also appropriations for the fiscal year 1931—Continued.*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Lassen Volcanic—Continued.				
1927	\$12,700.00	\$12,362.26	\$194.48	
1928	15,625.00	15,448.52	167.84	
1929	22,400.00	\$ 22,688.00	34.36	
1929 (deficiency)	460.00			
1930	25,300.00	25,061.16	3,089.55	
1931	30,500.00			
Mesa Verde:				
1917	10,000.00	9,999.00	130.14	(10)
1918	10,000.00	9,913.05	2,763.75	
1919	18,000.00	17,022.44	3,348.66	
1920	11,000.00	10,959.69	3,317.95	
1921	14,000.00	13,929.71	3,771.35	
1922	16,400.00	16,339.30	1,273.72	
1923	43,000.00	42,812.62	3,690.10	
1924	35,000.00	\$ 36,685.21	4,071.65	
1924 (deficiency)	3,000.00			
1925	42,500.00	43,183.46	3,599.45	
1925 (deficiency)	1,895.00			
1926	42,835.00	42,596.97	3,221.15	
1927	72,300.00	70,591.36	4,391.00	
1928	50,750.00	48,343.59	3,342.80	
1929	83,000.00	\$ 78,134.00	4,719.00	
1929 (deficiency)	1,115.00			
1930	57,000.00	53,910.66	4,870.62	
1931	96,800.00			
Mount Rainier:				
1917	30,000.00	29,999.19	14,346.80	\$17,617.04
1918	75,000.00	74,846.67	17,241.25	34,715.96
1919	24,600.00	24,552.28	17,336.47	(3)
1920	32,500.00	32,446.01	22,153.76	
1921	40,000.00	39,819.34	24,967.79	
1922	150,000.00	149,497.31	22,286.59	
1923	106,800.00	105,721.05	29,133.17	
1924	133,000.00	\$ 135,813.76	43,014.33	
1924 (deficiency)	8 13,000.00			
1925	100,000.00	117,906.78	51,395.58	
1925 (deficiency)	5,230.00			
1926	106,500.00	\$ 101,777.55	56,631.25	
1927	111,000.00			
1928	108,000.00	109,768.24	28,613.30	
1929	108,000.00	105,447.74	32,495.50	
1929	141,000.00	\$ 141,285.00	39,233.17	
1929 (deficiency)	3,370.00			
1929–30 (deficiency)	2,500.00	125,214.00	41,530.31	
1930	122,600.00			
1931	180,900.00			
Mount McKinley:				
1922	8,000.00	7,792.88		
1923	8,000.00	7,850.61		
1924	8,000.00	7,730.85		
1925	11,020.00	11,497.89	68.93	(3)
1925 (deficiency)	700.00			
1926	13,800.00	13,575.86	135.45	
1927	18,700.00	18,474.18	45.68	
1928	22,000.00	21,314.12	63.04	
1929	35,900.00	\$ 36,165.00	1.00	
1929 (deficiency)	740.00			
1930	40,000.00	37,680.26	213.18	
1931	46,700.00			
Platt:				
1917	8,000.00	8,000.00	434.11	138.28
1918	7,180.00	7,179.84	1,010.40	1,699.88
1919	7,500.00	7,485.05	482.63	(3)
1920	6,000.00	5,980.24	486.59	
1921	9,000.00	8,900.70	726.20	
1922	7,500.00	7,238.26	519.80	
1923	7,500.00	7,325.62	65.30	
1924	10,000.00	9,982.48	74.14	
1925	10,000.00	11,916.20	60.50	
1925 (deficiency)	1,920.00			
1926	17,920.00	17,818.60	54.13	

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917–1930,¹ inclusive; also appropriations for the fiscal year 1931—Continued.*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Platt—Continued.				
1927.....	\$12,400.00	\$12,148.42	\$50.00	-----
1928.....	13,050.00	12,991.87	77.16	-----
1929.....	18,000.00	19,053.00	33.05	-----
1929 (deficiency).....	1,080.00			-----
1930.....	16,200.00	16,178.70	-----	-----
1931.....	18,500.00	-----	-----	-----
Rocky Mountain:				
1917.....	10,000.00	9,964.24	871.27	(¹⁰)
1918.....	10,000.00	9,922.10	598.75	-----
1919.....	10,000.00	9,993.94	307.50	-----
1920.....	10,000.00	9,924.85	1,507.78	-----
1921.....	40,000.00	39,945.40	537.25	-----
1922.....	65,000.00	64,923.10	2,695.41	-----
1923.....	73,900.00	73,153.99	3,077.08	-----
1924.....	74,280.00	74,000.03	582.38	-----
1924 (deficiency).....	⁸ 26,171.00	122,888.53	3,183.83	-----
1925.....	93,000.00			-----
1925 (deficiency).....	4,540.00	⁴ 82,259.56	2,538.35	-----
1926.....	84,660.00			-----
1927.....	87,000.00	85,844.22	2,401.88	-----
1928.....	97,620.00	95,612.07	924.12	-----
1929.....	95,500.00	⁴ 95,230.00	1,537.07	-----
1929 (deficiency).....	2,380.00			-----
1930.....	96,000.00	94,871.34	4,471.24	-----
1931.....	105,950.00	-----	-----	-----
Sequoia:				
1917.....	22,300.00	15,605.28	10,326.60	\$415.04
1918.....	⁹ 50,000.00	50,000.00		
1919.....	25,000.00	24,578.71	13,402.53	25,508.45
1920.....	30,510.00	30,420.98	9,772.52	(⁸)
1921.....	35,000.00	34,824.54	15,899.00	-----
1922.....	36,000.00	35,732.79	19,584.99	-----
1923.....	86,000.00	85,961.84	20,086.27	-----
1924.....	78,000.00	77,671.62	23,917.22	-----
1924.....	120,000.00	119,590.60	24,220.21	-----
1925.....	136,000.00	140,638.90	19,981.08	-----
1925 (deficiency).....	5,810.00			-----
1926.....	71,710.00	⁴ 72,412.22	26,356.16	-----
1927.....	73,750.00	73,731.58	29,486.10	-----
1928.....	109,000.00	108,863.10	35,105.83	-----
1929.....	113,000.00	⁴ 114,626.00	30,753.00	-----
1929 (deficiency).....	3,440.00			-----
1930.....	130,000.00	130,056.49	33,934.54	-----
1931.....	113,100.00	-----	-----	-----
Wind Cave:				
1917.....	2,500.00	2,499.87	1,632.60	1,013.04
1918.....	2,500.00	2,498.40	4,082.60	8,006.53
1919.....	4,000.00	3,988.77	2,533.15	(⁸)
1920.....	4,000.00	3,987.24	3,714.15	-----
1921.....	5,000.00	4,971.55	2,918.20	-----
1922.....	7,500.00	7,500.00	3,785.25	-----
1923.....	7,500.00	7,443.84	3,869.00	-----
1924.....	10,000.00	9,934.56	3,856.50	-----
1925.....	10,000.00	10,800.63	4,232.61	-----
1925 (deficiency).....	960.00			-----
1926.....	10,960.00	⁴ 11,827.07	5,934.54	-----
1927.....	10,275.00	10,228.26	6,840.50	-----
1928.....	10,850.00	11,500.00	12,725.50	-----
1929.....	11,000.00	11,744.00	13,178.17	-----
1929 (deficiency).....	760.00			-----
1930.....	13,500.00	13,442.51	16,715.01	-----
1931.....	54,900.00	-----	-----	-----
Yellowstone:				
1917.....	8,500.00	8,500.00	54,795.69	53,775.61
1918.....	10,500.00	9,645.82	71,393.56	96,812.34
1919.....	334,920.00	332,583.03	42,775.50	(⁸)
1919.....	⁷ 3,259.48	539.44	-----	-----
1920.....	255,500.00	253,577.15	120,027.61	-----
1920 (deficiency).....	71,026.64	71,026.64	-----	-----
1921.....	278,000.00	285,992.28	158,806.84	-----
1921 (deficiency).....	8,000.00			-----

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917-1930,¹ inclusive; also appropriations for the fiscal year 1931—Continued.*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Yellowstone—Continued.				
1922.....	\$350,000.00	\$348,746.54	\$165,014.53	-----
1923.....	361,800.00	361,687.86	203,140.02	-----
1924.....	368,000.00	} 395,139.06	299,132.97	-----
1924 (deficiency).....	27,700.00			-----
1925.....	372,800.00	} 394,086.50	318,861.60	-----
1925 (deficiency).....	24,103.00			-----
1926.....	396,000.00	} 393,190.23	356,193.56	-----
1927.....	398,000.00			-----
1928.....	400,000.00	} 399,150.00	230,674.69	-----
1929.....	434,000.00			-----
1929 (deficiency).....	12,230.00	} 443,230.00	289,388.95	-----
1930.....	453,000.00			-----
1930 (deficiency).....	17,000.00	} 463,306.47	317,238.17	-----
1931.....	501,275.00			-----
Yosemite:				
1917.....	250,000.00	249,987.45	53,500.66	\$55,098.45
1918.....	235,000.00	226,368.29	65,865.65	88,975.62
1919.....	255,000.00	254,294.64	57,520.03	(?)
1920.....	200,000.00	197,611.29	85,601.54	-----
1921.....	300,000.00	} 300,645.44	95,894.47	-----
1921 (deficiency).....	3,000.00			-----
1922.....	300,000.00	} 295,079.94	131,797.51	-----
1923.....	280,000.00			-----
1924.....	295,000.00	} 294,768.42	148,860.60	-----
1925.....	309,000.00			-----
1925 (deficiency).....	21,414.00	} 324,414.85	137,200.14	-----
1926.....	252,714.00			-----
1927.....	256,640.00	} 243,703.59	231,209.14	-----
1928.....	301,000.00			-----
1928 (deficiency).....	15,000.00	} 257,363.73	239,382.94	-----
1929.....	387,250.00			-----
1929 (deficiency).....	14,385.00	} 449,159.00	237,166.90	-----
1930.....	412,360.00			-----
1930 (deficiency).....	5,381.00	} 390,204.38	280,355.45	-----
1931.....	510,100.00			-----
Zion:				
1917 (deficiency).....	15,000.00	14,963.81	-----	-----
1920.....	-----	-----	511.50	(?)
1921.....	7,300.00	} 8,825.96	524.00	-----
1921 (deficiency).....	1,585.07			-----
1922.....	10,000.00	} 9,968.62	414.95	-----
1923.....	10,000.00			-----
1923-24 (deficiency).....	133,000.00	} 144,066.88	913.25	-----
1924.....	13,750.00			-----
1925.....	15,190.00	} 15,282.02	195.80	-----
1925 (deficiency).....	1,560.00			-----
1926.....	20,000.00	} 19,968.90	479.50	-----
1927.....	22,000.00			-----
1928.....	30,900.00	} 30,737.69	2,231.00	-----
1929.....	40,500.00			-----
1929 (deficiency).....	795.00	} 40,569.00	3,106.50	-----
1930.....	38,300.00			-----
1930.....	33,200.00	} 42,290.11	7,724.01	-----
1931.....	33,200.00			-----
George Washington B. P. Natl. Mon.:				
1930 (deficiency).....	996.18	987.71	-----	-----
1930-31 (deficiency).....	80,000.00	-----	-----	-----
1931.....	2,500.00	-----	-----	-----
Protection of national monuments:				
1917.....	3,500.00	2,586.66	-----	-----
1918.....	5,000.00	4,832.70	225.00	(11)
1919.....	10,000.00	9,473.10	320.75	-----
1920.....	8,000.00	7,802.92	123.50	-----
1921.....	8,000.00	7,838.99	123.20	-----
1922.....	12,500.00	12,019.98	39.00	-----
1923.....	12,500.00	11,385.55	135.38	-----
1924.....	12,500.00	11,774.15	23.50	-----
1925.....	20,750.00	} 21,179.10	57.00	-----
1925 (deficiency).....	1,230.00			-----
1926.....	46,980.00	46,752.31	72.00	-----

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917-1930,¹ inclusive; also appropriations for the fiscal year 1931—Continued.*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Protection of national monuments—Continued.				
1927.....	\$21,270.00	\$21,094.93	\$66.00	-----
1928.....	25,000.00	24,042.56	132.00	-----
1929.....	35,000.00	35,951.00	97.00	-----
1929 (deficiency).....	1,225.00			-----
1930.....	46,000.00	42,634.76	100.00	-----
1931.....	83,900.00	-----	-----	-----
Casa Grande National Monument:				
1917.....	900.00	(12)	-----	-----
1918.....	900.00	(12)	-----	-----
1919.....	900.00	(12)	-----	-----
Improvement of Navajo National Monument, Ariz.: 1917	13 3,000.00	1,962.69	-----	-----
Carlsbad Cave National Monument:				
1926.....	(14)	-----	3,718.00	-----
1927.....	15,000.00	14,467.80	32,628.00	-----
1928.....	30,000.00	28,492.84	55,682.00	-----
1929.....	70,000.00	4 63,490.00	84,983.45	-----
1929 (deficiency).....	260.00			-----
1930.....	100,000.00	103,271.01	136,241.78	-----
1931.....	165,600.00	-----	-----	-----
National Park Service:				
1917.....	3,666.67	2,513.62	-----	-----
1918.....	17,600.00	17,413.33	-----	-----
1919.....	19,200.00	19,177.50	-----	-----
1920.....	22,220.00	21,524.46	-----	-----
1921.....	27,420.00	27,090.59	-----	-----
1922.....	31,020.00	30,957.72	-----	-----
1923.....	32,420.00	32,383.50	-----	-----
1924.....	33,200.00	32,922.67	-----	-----
1925.....	44,000.00	46,632.92	-----	-----
1925 (deficiency).....	2,700.00			
1926.....	51,000.00	-----	-----	-----
1927.....	55,680.00	55,678.35	94.00	-----
1928.....	57,100.00	57,047.56	20.10	-----
1929.....	70,200.00	4 75,714.00	-----	-----
1929 (deficiency).....	4,660.00			
1930.....	80,830.00	81,864.36	0.25	-----
1931.....	117,000.00	-----	-----	-----
Fighting forest fires:				
1922.....	25,000.00	9,618.30	-----	-----
1923.....	25,000.00	17,764.16	-----	-----
1924.....	25,000.00	6,526.02	-----	-----
1925.....	20,000.00	20,000.00	-----	-----
General expenses, N. P. S.: 1931	25,000.00	-----	-----	-----
Emergency reconstruction: 1925	20,000.00	17,009.15	-----	-----
Forest protection and fire prevention: 1931	96,850.00	-----	-----	-----
Emergency reconstruction and fighting forest fires:				
1926.....	40,000.00	80,000.00	-----	-----
1926 (deficiency).....	40,000.00			
1927.....	40,000.00	40,000.00	-----	-----
1927 (deficiency).....	235,000.00	228,647.83	-----	-----
1928.....	40,000.00	16 26,865.46	-----	-----
1929 (deficiency).....	29,000.00	40,138.26	-----	-----
1930.....	20,000.00	180,300.17	-----	-----
1930 (deficiency).....	180,000.00			
1931.....	50,000.00	-----	-----	-----
Accounting services:				
1923.....	6,000.00	5,216.60	-----	-----
1924.....	6,000.00	5,992.11	-----	-----
1925.....	6,000.00	5,564.15	-----	-----
1926.....	6,000.00	5,899.19	-----	-----
1927.....	-----	-----	-----	-----
1928.....	6,000.00	5,835.71	-----	-----
Construction of roads and trails:				
1925 (deficiency).....	1,000,000.00	995,200.61	-----	-----
1926.....	1,500,000.00	1,500,000.00	-----	-----
1927.....	2,000,000.00	2,000,000.00	-----	-----
1928.....	2,000,000.00	2,000,000.00	-----	-----

Footnotes at end of table.

NATIONAL PARKS TABLE 11.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during the fiscal years 1917-1930,¹ inclusive; also appropriations for the fiscal year 1931—Continued.*

Name of the national park	Appropriations		Revenue	
	Appropriated	Expended	Received	Expended
Construction of roads and trails—Continued.				
1928 (deficiency).....	\$1,000,000.00	\$1,000,000.00	-----	-----
1929.....	2,500,000.00	2,500,000.00	-----	-----
1930.....	5,000,000.00	5,000,000.00	-----	-----
1931.....	5,000,000.00	-----	-----	-----
Insect control:				
1925-26 (deficiency).....	25,000.00	24,945.24	-----	-----
1927.....	20,000.00	19,828.96	-----	-----
1928.....	7,500.00	7,379.35	-----	-----
Southern Appalachian:				
1925-26 (deficiency).....	20,000.00	12,453.27	-----	-----
1927.....	(15) 7,252.21	7,252.21	-----	-----
1928.....	5,000.00	1 ⁶ 3,887.13	-----	-----
1929.....	4,500.00	1 ⁷ 3,945.07	-----	-----
1930.....	3,000.00	3,415.75	-----	-----
1931.....	3,000.00	-----	-----	-----
Purchase of lands:				
1928.....	50,000.00	13,925.00	-----	-----
1929.....	50,000.00	1,383.00	-----	-----
1930.....	250,000.00	17,233.93	-----	-----
1931.....	1,750,000.00	-----	-----	-----
Extension of winter-feed facilities:				
1930.....	75,000.00	7,612.50	-----	-----
1931.....	75,000.00	-----	-----	-----

¹ For statement of appropriations and revenues prior to 1917 see 1920 Annual Report, pp. 354-358.

² Appropriation for 1919 made under the name of Sieur de Monts National Monument.

³ Expenditure of revenue for park purposes not authorized. Sundry civil act of June 12, 1917 (40 Stat. 153); Hot Springs, act of May 24, 1922 (42 Stat. 590).

⁴ Appropriation transfer. See Table 13.

⁵ Made available during fiscal years 1920 and 1921 by sundry civil acts approved July 19, 1919 (41 Stat. 204), and June 5, 1920 (41 Stat. 918).

⁶ Includes \$15,855 from sale of lots in 1925; \$8,500 in 1926.

⁷ Unexpended balance of 1918 War Department appropriation of \$20,000 made available under Interior Department during 1919. Sundry civil act of July 1, 1918 (40 Stat. 678).

⁸ Made available during 1925, act of Mar. 4, 1925 (43 Stat. 1331).

⁹ For purchase of private holdings.

¹⁰ Expenditure of revenues from Mesa Verde and Rocky Mountain Parks for park purposes not authorized by statute.

¹¹ Expenditure of revenue for monument purposes not authorized.

¹² Expended under the direction of the Commissioner of the General Land Office.

¹³ Expended under direction of Smithsonian Institution.

¹⁴ \$5,000 and \$25,000 of appropriation for protection of national monuments for 1925 and 1926, respectively, specifically made available for Carlsbad Cave.

¹⁵ Unexpended balance of 1925-26 appropriation made available for expenditure in 1927. Act of July 3, 1926 (44 Stat. 857).

¹⁶ \$35,000 reappropriated and made available for expenditure in Yosemite during fiscal year 1929; \$1,112.87 reappropriated and made available for expenditure for Southern Appalachian during fiscal year 1929; \$13,134.54 reappropriated and made available for expenditure for emergency reconstruction and fighting forest fires during fiscal year 1929.

¹⁷ \$8,661.78 reappropriated and made available for expenditure in Yosemite during fiscal year 1930; \$4,950 reappropriated and made available for expenditure at Carlsbad Cave during fiscal year 1930; \$1,662.55 reappropriated and made available for expenditure for Southern Appalachian during fiscal year 1930.

¹⁸ \$2,850 reappropriated and made available for expenditure in Acadia during fiscal year 1931; \$1,091.06 reappropriated and made available for expenditure in Crater Lake during fiscal year 1931; \$1,652.18 reappropriated and made available for expenditure in Mesa Verde during fiscal year 1931; \$32,662.70 reappropriated and made available for expenditure in Yosemite during fiscal year 1931; \$2,500 reappropriated and made available for expenditure in National Monuments during fiscal year 1931; \$1,246.80 reappropriated and made available for expenditure in Southern Appalachian National Park during fiscal year 1931; \$20,000 reappropriated from 1930 appropriation and made available for expenditure in Grand Canyon National Park.

¹⁹ \$4,500 transferred from Bryce Canyon to Zion under first deficiency act of 1930 to be available for expenditure in Zion during fiscal year 1930.

NATIONAL PARKS TABLE 12.—*Summary of appropriations for the administration, protection, and improvement of the national parks and national monuments, together with the revenues received, for the fiscal years 1917¹–1931, inclusive*

Year	Department	Appropriation	Revenues
1917	Interior Department..... War Department.....	\$537,366.67 247,200.00	
		\$784,566.67	\$180,652.30
1918	Interior Department..... War Department.....	530,680.00 217,500.00	
		748,180.00	² 217,330.55
1919	Interior Department..... War Department.....	963,105.00 50,000.00	
		1,013,105.00	196,678.03
1920		907,070.76	316,877.96
1921		1,058,969.16	396,928.27
1922		1,433,220.00	432,964.89
1923		1,446,520.00	513,706.36
1924		1,892,601.00	663,886.32
1925		3,027,657.00	670,920.98
1926		3,258,409.00	826,454.17
1927		3,698,920.00	703,849.60
1928		4,889,685.00	808,255.81
1929		4,754,015.00	849,272.95
1930		7,813,817.18	1,015,740.56
1931		9,999,135.00	-----

¹ For summary of appropriations and revenues prior to 1917 see 1920 Annual Report, p. 359.

² The revenues from the various national parks were expendable during the years 1904 to 1918, inclusive, with the exception of those received from Crater Lake, Mesa Verde, and Rocky Mountain National Parks, the revenues from which were turned into the Treasury to the credit of miscellaneous receipts.

NATIONAL PARKS TABLE 13.—*Statement of amounts transferred under the authority contained in the appropriation acts to transfer 10 per cent from one appropriation to another*

Year	Amount	From—	To—
1924.....	\$3,000.00	Yosemite National Park.....	Mount Rainier National Park.
1924.....	1,000.00	do.....	Mesa Verde National Park.
1924.....	1,000.00	Zion National Park.....	Do.
1924.....	1,900.00	Mesa Verde National Park.....	Glacier National Park.
1924.....	800.00	Grand Canyon National Park.....	Do.
1924.....	200.00	Yellowstone National Park.....	Do.
1925.....	1,000.00	Hot Springs National Park.....	Zion National Park.
1925.....	500.00	Grand Canyon National Park.....	Do.
1925.....	1,000.00	Yellowstone National Park.....	Wind Cave National Park.
1926.....	913.00	do.....	Sequoia National Park.
1926.....	1,062.00	Rocky Mountain National Park.....	Mount Rainier National Park.
1927.....	200.00	Grand Canyon National Park.....	Sequoia National Park.
1928.....	200.00	do.....	Wind Cave National Park.
1928.....	450.00	Yellowstone National Park.....	Do.
1929.....	125.00	Crater Lake National Park.....	National Park Service.
1929.....	150.00	Hawaii National Park.....	Do.
1929.....	117.00	Mesa Verde National Park.....	Do.
1929.....	125.00	Mount McKinley National Park.....	Do.
1929.....	200.00	Mount Rainier National Park.....	Do.
1929.....	100.00	Rocky Mountain National Park.....	Do.
1929.....	100.00	Carlsbad Cave National Monument.....	Do.
1929.....	1,100.00	Glacier National Park.....	Crater Lake National Park.
1929.....	700.00	Grand Canyon National Park.....	Do.
1929.....	85.00	Hawaii National Park.....	Do.
1929.....	400.00	Hot Springs National Park.....	Do.
1929.....	115.00	Lassen Volcanic National Park.....	Do.
1929.....	4,000.00	Mesa Verde National Park.....	Do.
1929.....	1,000.00	Mount Rainier National Park.....	Do.
1929.....	2,000.00	Rocky Mountain National Park.....	Do.
1929.....	700.00	Sequoia National Park.....	Do.
1929.....	3,000.00	Yellowstone National Park.....	Do.
1929.....	600.00	Yosemite National Park.....	Do.
1930.....	700.00	Hot Springs National Park.....	National Park Service.
1930.....	334.36	Rocky Mountain National Park.....	Do.
1930.....	2,000.00	Crater Lake National Park.....	Glacier National Park.
1930.....	300.00	Mesa Verde National Park.....	Mount Rainier National Park.
1930.....	4,500.00	Bryce Canyon National Park.....	Zion National Park.

APPENDIX D

REPORTS OF OFFICERS IN CHARGE OF THE NATIONAL PARKS, MONUMENTS, AND ENGINEERING, EDUCATIONAL, LANDSCAPE, ARCHITECTURAL, AND FORESTRY DIVISIONS, ALSO REPORTS ON SANITATION, FISH-CULTURAL OPERATIONS, AND SURVEY OF WILD-LIFE CONDITIONS

ACADIA NATIONAL PARK

GEORGE B. DORR, Superintendent, Bar Harbor, Me.

Developments that it will take years to complete are in the making at Acadia National Park. These are largely concerned with the intended gift of the most magnificent stretch of ocean front on the Atlantic coast with other lands essentially important to the park held until now in private ownership.

Over these lands the donation of a superb extension of the present park motor-road system is intended in accordance with plans prepared under the direction of Mr. Frederick Law Olmsted, whose name and wide experience in public work are guarantee of the thought and care with which the study has been made.

The plan proposed and the lands secured for its execution will surround Bar Harbor and its environs with park lands following in a grand sweep the mountainous formation from the ocean front to the bluffs on Frenchmans Bay.

APPROACHES TO PARK

The approach to the park over the designated highway from Bangor to Bar Harbor is being materially extended this year from the bridge above the Narrows under plans approved by the Bureau of Public Roads. The town of Bar Harbor is liberally sharing in the expense of this extension. This is a concrete road of the best construction.

A new steel and concrete bridge over the Penobscot River at Bucksport, near where it debouches upon Penobscot Bay, is in process of building at a cost approximating a million dollars, the expense being borne by the State of Maine. This bridge, together with one of similar character and yet greater cost recently constructed at Bath across the Kennebec, will give the park a continuous and most attractive shore-highway approach from Boston, with an alternate highway connection inland from Portland through the State capital at Augusta, at the head of navigation on the Kennebec, and through Bangor at its head on the Penobscot.

THE SEAWALL RADIO STATION

The Seawall Radio Station, beyond Southwest Harbor on the ocean front, has been turned over to the park by act of Congress. This, before its purchase by the Government, was an abandoned farm of some 200 acres, the home of early settlers, watered abundantly from the old farm well. It contains a house and garage upon it built by the Government during the war. This tract, with grasslands bordering widely on the shore, is admirably suited for camp-ground purposes.

THE INDIAN MUSEUM

In August the Indian Museum near Sieur de Monts Spring, built on land donated by the Spring Corporation for the purpose, was freely deeded to the park and a perpetual lease given to the museum trustees for its maintenance and operation.

The trustees hold an endowment fund of \$60,000 which will be used for this purpose.

An archeologist of the region, Walter B. Smith, is in charge of its collections and of making them educationally valuable to the wide public visiting them. A special fund for an annual publication on the Indians of the region, their arts and crafts and relation with the early colonists, which will be published in connection with the museum, has been donated by a trustee of the museum who is a descendant of Governor Endicott. This will be known as the Governor Endicott Series.

GROWTH OF THE PARK

The growth of the park has been held back by the lack of funds for perfecting to the Government's high standard of requirement the title to lands long since acquired and held for the Government's acceptance. For this purpose funds were provided in the park's 1930 budget, and much territory in the western portion of the island is now in process of transfer.

THE SUMMIT ROAD

The road being built under the direction of the Bureau of Public Roads to the summit of Cadillac Mountain from the present motor road to Jordan Pond is nearing completion and will be done this fall with the exception of its surfacing, which will be made the subject of a special contract and completed in the spring. No road in the country overhanging the ocean can ever be built that will compare with this in magnificence of outlook and the beauty of the views it will command on every side.

CHANNEL DEEPENING WOULD AFFECT PARK WATERWAYS

A matter of great importance to the park in the development of its recreational contact with the sea has recently arisen, brought forward by the inclusion by Senator Hale in the naval estimate bill recently passed of an item for survey and report upon the project of deepening the channel through the Mount Desert Narrows which connects Frenchmans Bay with the islanded and sheltered western waters that extend for 40 miles along the coast to Penobscot Bay and the long tidal estuary of its river. A hearing was held upon the subject recently in Bar Harbor before Col. S. A. Cheney, United States Army, district engineer, and the project was strongly supported by both resort and commercial interests and summer residents.

Deepening and straightening this channel will make accessible to motor boats from Frenchmans Bay, without the lifting of the draw, the most beautiful and extensive archipelago on the Atlantic coast and will afford direct, safe, and speedy motor-boat connection between the western harbors on Mount Desert Island, the islands and the coast beyond, and the great sheet of island-sheltered water upon the east, on which the motor-boating activities of the park must always center.

VISIT OF DIRECTOR

Acadia National Park had its first visit from Director Albright at the end of June. All was new to him and in all he saw he took the greatest interest. Such a visit, brief though it had to be, can not but be richly fruitful.

Director Albright at once made plans to return next summer for a longer stay, when he can study at leisure the unique possibilities of this coastal territory in the recreational and educational development of the national-park system.

THE SCHOODIC TERRITORY

Director Albright recognized at once the necessity of a well-built park road opening to the public the recently acquired Schoodic territory across Frenchmans Bay, upon whose far-flung point the surf beats more splendidly than elsewhere on this rocky coast, and from the heights of whose bold headland the view eastward, to the sunrise and the entrance to the Bay of Fundy, is unequalled. He therefore authorized a survey for it by the Bureau of Public Roads, and this is now in process.

A proposal was made last spring by Admiral Andrews, since retired, but then at the head of the first naval district, that the radio station now at Otter Cliffs be located on park land at Schoodic. The site, he said, is the finest on the Atlantic coast for radio communication. That the park should furnish such opportunity for the guidance that means safety to ships at sea and swift and sure communication with England and the lands of western Europe appeals to the imagination.

The inclusion in the park of this grand projection into the ocean, fronting the eastern mountains of the park across the entrance to Frenchmans Bay, was of the first importance.

This inclusion, it is to be recorded, is one of the fruits of the brief visit to the park two years ago of Congressman Louis C. Cramton, chairman of the House Committee upon Interior Department Appropriations, to whose suggestion, encouragement, and support the act making it possible is due.

Another fruit of this most fruitful visit is found in the attractive development, made and making, of the national park camp ground at the foot of Champlain Mountain, which is sought and used by people of a type far beyond the usual—teachers, artists, men of affairs—who, one of them recently told the superintendent, preferred it in its beauty of location, its convenience, and its out-door freedom, to a hotel, even of a costly type.

PRYOR'S ISLAND

Pryor's Island, at the head of Somes Sound, has obtained recognition during the last two years as one of the outstanding possessions of the park. It now has excellent landing facilities, being visited by people who come to it by water only, for it has no land approach. Its one need is that of a good water supply, probably to be best obtained by an artesian well. The park recently entertained at supper there some forty members of the New England Tercentenary touring committee headed by Governor Tobey, of New Hampshire, and letters received by the superintendent afterwards spoke of it as the crowning point of their entire trip.

RESORT TOWNS IMPORTANT TO PARK

Acadia National Park finds in the old resort towns that lie about it the convenience to visitors of hotels and stores, of hospital and medical attendance, and of much besides that are supplied generally in other national parks by the enterprise of concessioners. It can not, therefore, be indifferent to the developments that take place in them. At Bar Harbor a health commissioner with duties extending over the whole island has been established, the expense borne in part by the towns, in part by the summer residents who have been instrumental in bringing this about. There, too, a new casino has been built, opened this summer, at a cost shared among the summer residents ambitious for the resort, while at Northeast Harbor a town-planning movement is on foot that will transform it at large cost and give it new attraction, the movement for it being led by one of the most public-spirited citizens of Pennsylvania, Vance McCormick.

The superintendent of the park looks forward to steadily increasing cooperation between the Federal activities of the national park and those of these resorts, by which each will benefit, in health, in service, and in opportunities for pleasure.

BRYCE CANYON NATIONAL PARK

EIVIND T. SCOYEN, Superintendent, Springdale, Utah

ADMINISTRATION AND ORGANIZATION

Bryce Canyon National Park was established September 15, 1928, under authority of the acts of Congress approved June 7, 1924, and February 25, 1928. Final creation of the park was conditional upon the transfer of all private holdings in the area to the Government, and this was accomplished on the above date.

The park has just closed its second season of operation under control of the National Park Service and much was accomplished in fitting it into the present scheme of organization. The superintendent, supervisor, chief ranger, and chief clerk of Zion Park also have appointments covering these same posi-

tions at Bryce Canyon. With the exception of local operations all other features of the Bryce work are handled jointly with that of Zion Park, which eliminates much of the duplication which would occur if an entirely separate organization were maintained.

During the summer a temporary ranger was in immediate charge of the park. A general foreman looked after construction and maintenance activities. Educational work was handled by a ranger naturalist. The total appointive force consisted of two temporary rangers, a ranger naturalist, and a storekeeper. The greatest number of temporary employees on the pay roll was 48 in September, 1929.

WEATHER CONDITIONS

Due to the fact that the rim of Bryce Canyon is 4,000 feet higher than the floor of Zion Canyon, the weather is considerably cooler. However, in a general way the weather records of Zion would also apply to Bryce, especially in showing relations to normal conditions.

The winter at Bryce was so light that it was possible to reach the rim every month of the past year. All approach roads were open the entire winter, and the one from Cedar City via Cedar Breaks until early in January, which is the latest closing of this section ever recorded.

PARK TRAVEL

Travel to the park totaled 35,982, an increase over last year of 13,985 or 63.5 per cent. The heaviest travel during any month was 11,399 in July, 1930.

Of the total number of visitors, 32,047 came in 10,007 motor vehicles, an increase of 14,836 over last year, or 86.2 per cent. Travel by rail amounted to 3,930, a loss of 854 over last year, or 17.8 per cent. Five entered by miscellaneous means.

Representation from States and foreign countries was about the same as at Zion Park.

The following table shows comparative park travel for 1929 and 1930:

Year	By automobile		By stage (rail)	Miscellaneous travel	Total visitors
	Cars	Passengers			
1930.....	10,007	32,047	3,930	5	35,982
1929.....	5,223	17,211	4,784	2	21,997
Increase.....	4,784	14,836		3	13,985
Decrease.....			854		
Per cent.....	91.6	86.2	17.8	150	63.5

The following table shows park travel by months:

Month	By automobile		By stage (rail)	Miscellaneous travel	Total, 1930	Total, 1929
	Cars	Passengers				
1930 ¹						
April.....	251	753			753	
May.....	631	2,031			2,031	1,554
June.....	2,610	7,873	700		8,573	4,365
July.....	2,977	9,915	1,480	4	11,399	6,293
August.....	2,446	8,094	1,177	1	9,272	6,039
September.....	1,092	3,381	573		3,954	3,746
Total.....	10,007	32,047	3,930	5	35,982	21,997

¹ The park travel year is from Apr. 1 to Sept. 30.

During the year 6,174 people in 1,877 cars camped in the one public auto camp.

PARK SERVICE ACTIVITIES

Construction.—All items of the 1930 construction program for Bryce Canyon were completed on September 30.

Two buildings were completed. A warehouse 64 feet by 30 feet was built and a small 2-stall barn. These are the first buildings to be put on our new utility area in this park.

Work on a trail system for the park was continued by building a horseback trail from the point where operations were discontinued last fall to Peek-a-boo Canyon, which is south of the famous Wall of the Windows. This trail, about 2 miles in length, makes it possible for park visitors to reach the Great Cathedral, Great Organ, and other of the more famous features of Bryce Canyon proper. The greatest study was given to the protection of the landscape in construction of this trail. As a result it reaches all of the more interesting points in the canyon, and only a few short sections are visible from the rim.

Next spring it is planned to pipe water from a spring near the head of Peek-a-boo to a fine spot of level ground and install a drinking fountain, thus making a lunch ground for people riding and hiking into this area.

The foot trails constructed last summer and the additional work during the present season have evidently met with wide approval by the traveling public. I have never seen a park where so many of the visitors take to the trails as is the case in Bryce.

The two major foot trails leave the rim at the same point. In order to get them over the first ledge with adequate protection to the landscape a stone and concrete stairway was built. This was so well designed and constructed that it can hardly be seen from any point on the rim.

Maintenance.—This is a minor item of operation in this park as the development is only started and we have very little to maintain.

Ranger activities.—Only two temporary rangers were on duty and practically all of their time was taken up in checking at the park entrance and keeping the public auto camp in order.

Educational work.—Much progress was made in this branch of operation the past year. The construction of fine foot trails into the canyon has made it possible to conduct a field trip into the canyon each day. In addition, a lecture was given each night at the lodge in cooperation with the Union Pacific system. Due to his peculiar fitness for the job the ranger naturalist was placed in charge of the park last spring, working under direction of the chief ranger. In order to handle the demand for this type of service another ranger naturalist must be provided before next season.

A total of 117 lectures was given and these lectures were attended by 13,564 people. Four thousand one hundred and sixty-four park visitors were present on 154 nature guide trips.

Office work.—Practically all work relating to purchase of supplies, disbursing, keeping accounts, making up estimates and reports, etc., for this park was handled in the Zion Park headquarters office.

Equipment purchased.—The only major item of equipment purchased was a Chevrolet sedan. Office furniture and equipment were also bought so that a small office could be established in the park.

PARK WILD LIFE

There is every evidence that deer in the park are on the increase. In an inspection this summer I was very much surprised to find the large amount of suitable winter range that has been included in the park boundaries. Under present conditions deer should be able to graze in the park either winter or summer.

Rangers estimate 173 head of deer in the park, and this is the only large game animal.

No predatory animal control work was attempted as close hunting outside the park lines should keep our animals down to reasonable numbers, perhaps even fewer than is desirable.

IMPROVEMENT OF APPROACH HIGHWAYS

The State of Utah has done considerable betterment work along United States Highway No. 89 which forms the main approach to Bryce. In general all of the roads leading to Bryce Canyon from points within the State are in a very satisfactory condition, and it is no hardship to any person to visit the park.

TOPOGRAPHIC MAP OF THE PARK

Aviation was called upon to solve the problem of mapping Bryce Canyon Park and the immediate vicinity. Under contract with the United States Geological Survey a Los Angeles firm made aerial photos of the area, and from these the map will be drawn.

IMPROVEMENT BY PARK OPERATORS

Only minor improvements were made by the Utah Parks Co. as present facilities seem adequate and are of a very high standard.

The most needed improvement is the establishment of a housekeeping camp. Plans are about complete for this development.

BOUNDARY EXTENSIONS

A bill (Public No. 352) approved June 13 authorized the President to extend the boundaries of the park by proclamation within certain areas. As soon as the necessary data can be worked out recommendation will be made as to the area to be included.

During the past summer I made several trips into the so-called Podunk Point area. I was very much surprised to find such a magnificent display of the Pink Cliff formation, which even exceeds Bryce Canyon in the marvels of its coloring, and some of its pinnacle exhibits have no rival anywhere. It is hard to see just why Bryce Canyon was made a national park and this wonderful area left out, especially when it is considered that it is only a few miles away and directly connected.

In addition to the large natural bridge sometimes known as the Bryce Bridge, another bridge was found with about twice the span and of beautiful proportions and color.

I also made an investigation of the Escalante Mountain or Table Cliff area. From Table Cliff Point is one of the most extensive views to be found anywhere in this section. Mountain ranges can be seen in five States on a perfectly clear day.

It is my personal opinion that when the boundaries of this park are worked out to their logical limits and roads and trails fully installed, it will be the major park operation in this section. Claims sometimes made that Bryce is a "10-minute park" merely indicate lack of information, as the strange forms to be found in these breaks in the Pink Cliff take on added interest as they are studied. No person, even in a lifetime, can expect to have time enough to see everything in Bryce Canyon Park.

LANDSCAPE WORK

During the year the landscape division made extensive studies on which to base a development plan for the park. Protection of the rim is the most important point to be considered. The canyon is so small that any man-made structure on its rim, or in the canyon, is decidedly out of place. It should also be the firm policy of the service never to allow a road to be built in the canyon below the rim.

GRAZING

In taking over the park it was necessary to continue some sheep-grazing permits on this area. It is desirable that these be eliminated at the earliest practicable time without working hardships on local residents.

Due to the fact the rim of the canyon is so close to the park boundary we are bothered a great deal with cattle and horses grazing in the park. A good fence is the only answer to this problem.

MISCELLANEOUS

Many of the general statements regarding the work in Zion Park also apply to Bryce Canyon as it has the same administrative organization. For this reason they will not be mentioned here. The same situation exists here with reference to cooperation with other departments, assistance of Park Service officers, etc.

CARLSBAD CAVERNS NATIONAL PARK

THOMAS BOLES, Superintendent, Carlsbad, N. Mex.

GENERAL STATEMENT

The establishment of the Carlsbad Caverns National Park by act of Congress approved May 14, 1930, is a fitting recognition of the remarkable beauty and great popularity of this great series of caves.

Thirty years ago the caves were unexplored. Now comfortable trails and hundreds of flood lights make the underground journey free from any feeling of caution. The lighting of Carlsbad Caverns is a masterpiece of artistic illumination.

As this is the first annual report from the caverns since its inclusion in the national-park class, a slight review of its history will not be amiss. Although the cavern entrance was known to neighboring ranchers for many years, the first exploration is credited to Jim White and a Mexican boy in 1901. Government recognition was obtained in 1923 through the illustrated reports of Robert Holley and Dr. Willis T. Lee, both of the Interior Department, and the area given national-monument status. As a monument the area was developed rapidly, soon taking a place among the larger national parks in travel interest.

The act establishing the Carlsbad Caverns National Park also authorized the President to select from the surrounding 193 square miles such areas as are deemed suitable for park purposes.

LOCATION

The gateway to the park is Carlsbad, a thriving little city of 4,000 in southwestern New Mexico, with several modern hotels and tourist camps, and a municipal bathing beach, so welcome to summer motorists. Daily train service is provided by the Santa Fe from Clovis on its main line, and from Pecos on the Texas & Pacific. Bus lines operate daily to Carlsbad from Roswell, N. Mex., and from Pecos, Van Horn, and El Paso, Tex.

NEAR-BY HOTELS AND CAMP GROUNDS

Since last season there has been a great increase in hotel and tourist camp capacity in Carlsbad so that 1,500 persons can now be accommodated. Near-by cities have also made earnest efforts to secure cavern tourists and have given the Carlsbad operators sharp competition. As these accommodations can be reached by a short drive from the cavern there seems no necessity for establishing hotels or camps inside the park, at least not until our water supply is more certain.

TRIPS

The cavern is open to visitors every day of the year, the regular trip starting each morning at 10.30 and requiring about five to six hours, including a 30-minute stop for lunch. During the summer months visitors are conducted in two, or even three, groups to avoid possible confusion in the underground lunch room. Guide service is provided for \$2 for each adult. No charge is made for children under 16 years of age. Although the cavern is known to extend for nearly 25 miles, the visitors at present are escorted over a 7-mile loop through the most spectacular portions of the known cavern. Recent trail construction and revisions make this underground trip much easier than heretofore, and even further improvements, including an elevator, will be made during the coming year. During the entire trip the visitors are under the guidance and control of uniformed park rangers, charged not only with their safety but with the protection of the cave formations.

PUBLIC UTILITY OPERATOR

The Cavern Supply Co., operating under its contract with the Interior Department, reports a satisfactory season in the sale of photographs and curios at its store on the surface, and in lunches inside the cavern. The new location of the underground lunch room is a great improvement over the old site.

VISITORS

During the 1930 travel season 90,104 visitors were conducted through the cavern, coming from every State and many foreign countries. Nearly 90 per cent of the travel originates outside of New Mexico. The heaviest travel is during the summer months, over 45,000 people visiting the cave during July and August. The season's largest day was August 31, with 1,500 visitors; but the most interesting group by far was on "Governor's Day," March 15, when Governor Dillon, of New Mexico, made the 7-mile underground tour accompanied by over 1,200 Pecos Valley high-school students.

PERSONNEL

During the 1930 fiscal year the superintendent, with headquarters at Carlsbad, has been assisted in his office work by a chief clerk and one part-time clerk, and all revenues and disbursings amounting to nearly a quarter-million dollars have been handled by this limited force. Nearly all the activities at the park are incidental to parking cars, maintaining the trails, lighting the cavern, surface and subterranean sanitation, protection of formations, and guiding of visitors. The protection force is in charge of a chief ranger, assisted by three permanent rangers and such temporary ranger guides as are necessary during the summer season. The chief ranger has been assigned supervision over the lighting and sanitation and over the construction of the sewer line and two structures built by day labor.

LOCAL DEVELOPMENT

Structural improvements include the superintendent's residence and garage built in Carlsbad on an attractive lot donated by the Carlsbad Chamber of Commerce.

At the cavern, the ticket office has been doubled in size and tripled in serviceableness; the new power house, 35 by 70 feet in size, of rough field stone, now safely houses our two large power units and has space for more units when needed. Sewer and water systems, including steel tanks of 300,000-gallon storage capacity, were completed, but owing to extreme drought we have not been able to fully utilize these. With strict conservation we have been able to obtain sufficient water from Oak Springs to meet our urgent demands. Very little change in cavern lighting was done this season, as the bulk of such funds was used in the purchase and installation of an additional power unit.

Underground trails have been improved along engineering standards for comfort and safety, with heavy pipe railings and wire netting where needed. The most interesting new trail is the Governor's Trail, along the west wall of the big room; but most important is the winding trail just inside the cavern entrance, including a short tunnel, which replaces the long flight of 216 steps. I doubt if anything will ever be built at the cavern, even an elevator, that will be more appreciated by our visitors.

HIGHWAYS

Nearly 97 per cent of our visitors come to the park in privately owned cars, and the development of tributary highways is most vital to the future of the cavern. The Highway Commissions of the States of New Mexico and Texas are fully aware of the value of the cavern as a tourist objective, and all near-by highways are open to traffic throughout the year. The State highway to the north of Carlsbad is in excellent condition, and rapid progress is being made on the highways to the east and to the south. The short route between the cavern and El Paso is open to travel but not fully completed. Surveys are made for a modern highway between Carlsbad and the park.

Considering the large amount of highway work done by the States of Texas and New Mexico, with comparatively little Federal aid, I sincerely trust that some means may be determined whereby the United States Government may absorb considerable of the costs of the near-by sections, at least within our proposed boundaries.

WEATHER

During 1930 the temperature has ranged from zero in midwinter to 112° F. on several days during the summer; but owing to the low humidity even these temperatures are not serious. New Mexico's dry air is famous for its health-

restoring qualities. The temperature inside the cavern remains at 56° F. throughout the entire year.

FLORA AND FAUNA

The most interesting feature of our animal life is the colony of 3,000,000 bats which live in the eastern portion of the cavern known as the Bat Cave. Many visitors remain at the cavern during the summer evenings to watch these bat flights and listen to the "bat lecture" given by one of our rangers. Ground squirrels and quail are quite tame and plentiful around the cavern entrance. New Mexico cacti and other desert plants near by furnish an excellent opportunity for future nature-guide service and steps in this direction have been made with our present ranger force.

LOCAL COOPERATION

In addition to the valuable cooperation we continue to receive from the Carlsbad Chamber of Commerce through the preparation and distribution of effective publicity, we are also appreciative of the liberal mention made of the cavern in the literature and advertising matter issued by the Chambers of Commerce of Artesia and Roswell, N. Mex., and of El Paso., Tex. Acknowledgment is also made of the many helpful courtesies received from the local office of the Bureau of Reclamation.

PUBLICITY

While the press of New Mexico and Texas, and even Colorado, have rivaled each other in cavern news, the outstanding publicity for this park during the past season was obtained through the New York Times and its connections in their daily reports of the experiences and findings of the Nicholson expedition which spent considerable time here in February. Through their interesting articles the Carlsbad Cavern was brought to the attention of millions of people throughout the world.

CRATER LAKE NATIONAL PARK

E. C. SOLINSKY, Superintendent

Crater Lake National Park has enjoyed a very fine season. Again all travel records have been broken with an increase of 22.8 per cent over that of the 1929 season. The service rendered the visitors was of high order and seemed to be appreciated.

Park visitors benefited by the road improvements both within the park and on the approaches outside. Satisfactory progress was made in our construction and landscaping program.

Director Albright spent two days in the park during August inspecting the various construction projects and assisting and advising with the different members of this organization.

We were fortunate in having two members of the advisory board visit the park this year, Dr. John C. Merriam on July 19 and Dr. Wallace W. Atwood on August 20. Both gentlemen took an active interest in our educational problems, including the design of the Sinnott Memorial Building and the various points along the rim which should be reached by the new Rim Road. Each spent two days in the park and their suggestions and advice proved a great benefit to this organization.

WEATHER

Precipitation was subnormal. The fall of 1929 was characterized by exceptionally fine weather which extended into December before the heavy snows started. The park roads were closed by snow on December 9. The weather during April and June of this year was generally fair and warm. May proved an unusually stormy month. During the travel season, from May 24 to September 1, the general weather conditions have been ideal for outdoor recreation. The total precipitation for the period, October 1, 1929, to September 1, 1930, was 37 inches.

TRAVEL IN 1930

The park visitors totaled 157,693, as compared with 128,435 last year, an increase of 22.8 per cent. This travel represented visitors from every State in the Union as well as from several foreign countries. The stage travel showed a total of 715, as compared with 1,074 last year, a decrease of 33.4 per cent.

The number of visitors reported at our public camp grounds are as follows: Rin, 5,129 cars, 14,373 people; Anna Spring, 568 cars, 1,829 people; Lost Creek 240 cars, 739 people; a total of 5,937 cars and 16,941 people. This compared with 9,449 people using the camp grounds last year shows an increase of 79.3 per cent.

Travel season by entrance gateways, 1929 and 1930

Gateway	By automobile		By motor cycle		Stage	Other	Total	
	Cars	Visitors	Vehicles	Visitors			Cars	Visitors
1930								
West.....	25,778	78,702	38	52	282	85	25,816	79,121
South.....	19,781	61,558	26	56	433	71	19,807	62,118
North.....	919	2,987	-----	-----	-----	-----	919	2,987
East.....	4,473	13,455	5	7	-----	5	4,478	13,467
Total.....	50,951	156,702	69	115	715	161	51,020	157,693
1929								
West and south.....	34,872	113,976	43	57	1,074	215	34,915	115,322
North.....	1,536	5,175	-----	-----	-----	-----	1,536	5,175
East.....	2,592	7,938	-----	-----	-----	-----	2,592	7,938
Total.....	39,000	127,089	43	57	1,074	215	39,043	128,435

ADMINISTRATION

Headquarters office.—The regular personnel consists of: The superintendent, chief clerk, and senior stenographer. This force is augmented during the summer season by two clerk-stenographers and one telephone operator. The maximum number of employees on the pay roll at one time was approximately 160.

Appropriations.—Appropriations made available since the date of last report are as follows:

National Park Service, 1930-31.....	\$70,049.00
Insect control.....	2,500.00
Fire prevention.....	3,000.00
Roads and trails (National Park Service).....	94,400.00
Roads and trails (Bureau of Public Roads).....	3,866.40

Revenues.—Funds collected during the fiscal year 1930 and deposited to the credit of miscellaneous receipts in the United States Treasury were as follows:

Auto and motor cycle permits.....	\$37,623.00
Studio.....	390.10
Meals sold.....	10.60
Total.....	38,023.70

ENGINEERING DEPARTMENT

This department is in charge of Associate Engineer Ward P. Webber, connected with the field headquarters office and assigned to this park during the construction season.

Road maintenance.—Due to the heavy increase in travel considerable maintenance work was necessary on our oiled roads. Several sections ranging in length from a half mile to a mile and a half had to be torn up, reprocessed, and relaid. The type of pavement used on these roads is such that with the

increasing use each year the annual maintenance costs will increase until such time as a more permanent pavement can be laid.

Marked improvement in the condition of our Rim Road, the North Entrance Road, and East Entrance Road was made this year. This work was made possible through the acquisition of new road equipment and funds that allowed extensive work in grading and smoothing up the road surfaces. The East Entrance Road, from Lost Creek ranger station to headquarters, and the Rim Road, from Lost Creek to North Entrance Junction, have been oiled for dust prevention.

Considerable expense was necessary in opening and clearing the slides from our new Crater Wall Trail. This trail is so located with the number of switchbacks on the loose sliding sides of the crater wall that it necessitates handling of the slide material several times before it can be disposed of, making the annual maintenance costs exceedingly high and out of proportion to its original cost.

Snow removal.—This park was exceedingly fortunate in securing a mechanical snow remover. This equipment is a rotary snowplow which proved very efficient in removing the snow from the roads. Through its use the road to the rim, from both the south and west entrances, was open to traffic on May 24, the earliest opening date in the history of the park.

The average depth of the snow removed on the road between headquarters and the rim was approximately 5 feet, with several drifts ranging from 7 to 9 feet deep. The North Entrance and Rim Roads were open to travel on June 26. This again sets a record for early opening and was made possible through the use of new equipment purchased this year. A Bates 80 tractor with Hall back-filler attached proved very efficient in removing the snow from these roads. The park roads were opened this year on the following dates: Klamath-Medford Loop, April 16; Anna Spring to park headquarters, April 25; headquarters to rim, May 24; and Rim Road and North Entrance Road, June 26.

CONSTRUCTION

Buildings.—One employees' cottage was constructed at headquarters. A new combination bathhouse and comfort station was completed at the rim. The Sinnott Memorial, located on Victor Rock, is under construction and it is hoped will be completed before the winter snows set in.

North rim ranger station has been completed. Delays were occasioned in the construction of this building, which was included in the 1930 estimates, because the location of the new Rim and Diamond Lake Road was not definitely determined until this year. Also the design of the building was changed from log to rock structure, which is far more suited to the climatic conditions and more fitted to the landscape.

Roads and trails (National Park Service).—Construction of the stone parapet along the lakeside of the rim promenade has been started and the work is progressing satisfactorily. When completed it will add very materially to the appearance of the rim area and will serve as a barrier to confine the people to the promenade.

A parking area at Elephant's Back has been completed and a water supply provided for the motorists, which proves a very great benefit during the hot summer days.

About 3,800 feet of the new Garfield Peak Trail have been completed. The allotment for this work has been expended. Additional funds will be required next year to complete its construction. The new trail will be approximately 8,000 feet in length. It will afford easy access for both foot and horse passengers to the top of this most interesting peak, where splendid views of the lake and surrounding country may be had. It no doubt will rival the new Crater Wall Trail to the lake in popularity with the visitor. The trail is being constructed on high standards with a minimum width of 4 feet and maximum grade of 15 per cent.

The new trail to Victor Rock and the new Sinnott Memorial have been completed with the exception of the surfacing.

About 9 miles of bridle paths have been completed leading from the rim to Anna Spring, with return trails, making a very interesting horseback trip.

Guard rails at the Anna Spring checking station and on one approach to Goodbye Bridge were constructed. Oil processing of the section of road crossing Goodbye Bridge was completed.

Roads and trails (Bureau of Public Roads).—The section of the East Entrance Road which was constructed and surfaced with crushed rock (project 5-A) during 1929 will be laid with an oil-processed surface. Contract for this work has already been awarded and it is expected that the work will be completed before winter snows set in.

Road improvements.—Both the South and West Approach Roads to the park have been improved and resurfaced and were kept in a very satisfactory condition during the past season.

Rim Road survey.—Work on the completion of the survey and design of the section of the Rim Road leading from the lodge area to the Diamond Lake Junction is in progress. In order to allow the contractors to go over the ground and insure an early starting of the construction next spring, it is planned to complete the survey work in time to preadvertise before the winter snows set in.

LANDSCAPE ENGINEERING

Landscape Architect T. C. Vint spent four days in the park going over the landscape and architectural problems in connection with the Rim Road location and Sinnott Memorial building, also the landscaping of the rim area.

M. S. Sager has been assigned to this park from the field headquarters office to supervise our architectural, landscape, and planning problems and has spent considerable time in the park supervising the various projects.

Roadside clean-up.—Roadside clean-up was carried on this year under an allotment of \$4,000. Last year about a mile and a half of roadside was thoroughly cleaned up at an expenditure of approximately \$1,500. This year it is hoped to complete the clean-up work of 5 miles of roadside, leaving approximately 15 miles to be completed during the next two or three years.

Landscaping and restoring vegetation in rim area.—With the \$1,500 allotted this work it is planned to plant a sample plot at the head of the new Crater Wall Trail in order to determine the costs, feasibility, and best methods to be used in restoring vegetation on this dry pumice area.

The type of building to be constructed on Victor Rock, as a memorial to Congressman Sinnott, has been given careful study by the landscape division and completed plans are now being made on a building that meets the approval of the advisory board, the landscape division, and the superintendent. Thus far the work on this building has been confined to leveling the ground and foundation construction.

SANITATION

An inspection of all of the camps, hotels, and utilities was made by Sanitary Engineer H. B. Hommon, who found them in a clean and satisfactory condition from a sanitary standpoint. Four men are employed throughout the year in sanitation work in the various camp grounds and utilities areas. All garbage and refuse are disposed of daily.

ELECTRICAL DEPARTMENT

Telephone system.—We have in operation 52.7 miles of grounded telephone lines. Because of the dry porous soil found in this territory it is practically impossible to get satisfactory service over a grounded telephone system. In order to provide a suitable service it is planned to reconstruct our entire system on a metallic circuit. The service now rendered the visitor in this park is very unsatisfactory and is the cause of numerous complaints.

MECHANICAL DEPARTMENT

This department is under the direction of our master mechanic assisted by from two to three temporary mechanics during the season. Because of the large amount of old war surplus equipment now in operation this department is kept very busy repairing and overhauling broken-down equipment. The continual breaking down of old trucks and tractors is a source of delay and expense and adds very materially to the costs of our various projects. This year marked a great step forward for this department so far as the acquisition of new equipment is concerned and it is hoped that it will be possible to replace all of the old war surplus equipment now in use with suitable machinery within the next year.

PROTECTION

The permanent personnel of this department consists of the chief ranger, W. C. Godfrey. Twelve temporary park rangers were added during the season. Regular patrols of our park roads were made, information, guide, and lecture service, compilation of travel statistics, checking entrance travel, and a wide range of other duties were carried on by the ranger department for the convenience and pleasure of the park visitor.

Forest fires.—Nineteen forest fires occurred in the park during the heavy lightning storms of August this year. Most of these fires were quickly suppressed and in no case was any serious damage done to park timber.

Under the 1931 appropriation, \$3,000 has been allotted to this park for fire prevention. Under this allotment, approximately 23 miles of motor ways will be constructed reaching the most serious fire hazards in our outlying districts. Under our fire-prevention program, 78.8 miles are required to provide adequate protection to the park timber. This program extends over a period of years and it is hoped that it will be continued each year without interruption until completed.

Insect control.—A rather extensive program of control work against the invasion of pine beetles was carried on during the period between May 14 and July 8. A total of 9,947 trees was treated this year at a total cost of \$6,696.11 or an average of 67 cents per tree. Due to the misunderstanding between the Bureau of Entomology and the Park Service, adequate funds for completely cleaning up the infested areas in the park were not allotted at the start of the work, and at that time it was only contemplated to clean up the areas along the roads and in the camp grounds. For that reason our organization was not adequate to completely clean up all infested areas with the additional funds allotted later in the season in the time allowed for this work, that is, before the beetles emerged. The result of this year's work will no doubt show a marked improvement on the areas treated next spring. However, there are some areas which we were unable to treat this year which will show a decided increase next spring and will require additional funds to clean up.

Dr. F. C. Craighead of the Bureau of Entomology, on his inspection trip through the areas treated, estimated that on the areas not completed there will be an additional 5,000 trees next spring which should be treated along with the clean up of the other areas covered this season. It was estimated that it would be necessary to treat between ten and fifteen thousand trees next spring in order to complete this work.

Fish.—Fishing in the lake was exceptionally good this season and many limit catches were reported. Also many fine catches were taken from Sun Creek and some of the other smaller streams in the park during the season. About 7,000 fingerling trout were planted in the lake and streams during last October. These fish were secured from the State Fish Hatchery at Butte Falls.

Animals.—Deer seem to be more numerous than in previous years and are commonly seen along our highways. In an endeavor to attract the deer to the concentrated areas, brick salt has been placed at Anna Spring, park headquarters, and about the rim area. Several deer have been seen at each of these salt licks at night, and no doubt with proper handling it will become common to have deer about our concentrated areas during the day.

A small herd of elk has been located about our south boundary, and on one occasion two of these animals were seen on the South Entrance Road near the park entrance.

Coyotes and bobcats seem to be in evidence and the smaller animals, such as badgers, marmots, chipmunks, and conies, are present throughout the park in great numbers.

Accidents.—Only minor accidents occurred in the park during the year, none of which were of enough importance to report.

One death occurred, that of Beaumont De Losh, of Medford, Oreg. He died of heart failure on the Crater Wall Trail on August 24. The body was removed to Medford, where an inquest was held.

EDUCATIONAL DEPARTMENT

The position of park naturalist was made permanent under the 1931 appropriation act. Three temporary ranger naturalists were appointed for the travel season. This department was in charge of Earl U. Homuth, who received the

temporary appointment of park naturalist. Mr. Homuth was taken ill on July 16 and was forced to resign this position. Mr. F. Lyle Wynd, ranger naturalist, assumed charge of the educational department and was recommended for temporary appointment to the position of park naturalist. The resignation of Mr. Homuth disrupted the educational division for this season, and its operation was not altogether satisfactory, due to the fact that the balance of the organization, with the exception of Mr. Wynd, were new in this work and not familiar with Crater Lake problems and information.

Dr. H. C. Bryant, assistant director, visited the park and gave valuable assistance in directing the educational programs. Through his assistance and advice we hope to obtain a suitable man to take charge of our educational activities as park naturalist.

During the travel season two lectures are given each night—one at the lodge and one at the community house. Two field trips daily are taken to various sections of the park. During the past year 112 field trips, with a total attendance of 2,330 people, were taken and 107 lectures, with a total attendance of 10,310 people, were given. Lectures at the community house are illustrated with lantern slides and moving pictures. We have several reels of film showing both winter and summer scenes and the flowers of Crater Lake which have proven of great interest to the park visitors.

The building formerly occupied by Kiser's Studio has been converted into an information office and has proved very satisfactory as a unit for making contact with the visitor. Through the use of this building it is estimated that 90 per cent of the visitors come in contact with our ranger or ranger-naturalist organization. This may be shown through the sales of Government publications this year as compared with last. Last year a total of 54 National Park Portfolios was sold, and this year the sales of this publication have already reached 1,000. The sale of other Government publications this year is in the same proportion.

Two thousand copies of our Nature Notes have been distributed.

PUBLIC UTILITY OPERATOR

While the total number of visitors to the park has shown a very marked increase over last year, the total revenues received this year by the utility operator shows a very marked decrease over that of last year. No additions or improvements were made this year by the operator. The 15 housekeeping cabins in use in connection with the cafeteria were found inadequate to supply the demand, and it is planned to construct and have ready for operation at the beginning of next season 34 additional cabins and a bathhouse and comfort station in connection therewith.

The service rendered by the operator has proven very satisfactory this year.

DEPARTMENT OF JUSTICE

Hon. William Gladstone Steel presided. No cases were brought to this court during the season.

DEPARTMENT OF THE INTERIOR

Inspection Service.—Mr. C. L. Gable and Mr. W. A. Blossom were in the park for several days examining the books of the utility operator. Mr. N. J. Wilt spent three days in the park. He gave advice concerning the various problems in the office.

DEPARTMENT OF AGRICULTURE

Bureau of Entomology.—Dr. F. C. Craighead, Mr. F. P. Keen, and Mr. Buckhorn, of the Bureau of Entomology, were in the park, inspecting the work done on beetle control.

MEDICAL SERVICE

Dr. R. E. Green, of Medford, Oreg., handled all of our medical cases. Fourteen minor cases were cared for during the season.

GENERAL GRANT NATIONAL PARK

JOHN R. WHITE, Acting Superintendent, Sequoia National Park, Calif.; GUY HOPPING, Assistant Superintendent, in Charge

GENERAL

The year in General Grant National Park has been characterized by marked improvement in conditions along various lines, although these could not, in most cases, be completed in time for full use this season. Oiling of approach roads by authorities in adjoining counties of Fresno and Tulare and similar improvement of main-traveled roads within park boundaries contributed greatly to the comfort and safety of our visitors. Changes in the water system supplying the park will assure an increased supply of water of improved quality sufficient to meet our needs for years to come.

Protection from the fire hazard was increased by construction of firebreaks flanking the most dangerous areas in the park, and old, long-neglected trails are opened to travel by foot or horse, leading this form of activity away from the motor-crowded highways, where danger threatens from the intermingling of all classes of travel upon a single way. Other new conveniences include a small annex to the Administration Building for use by the post office and the installation of a modern switchboard by the Reedley Telephone Co., where all calls, Government or commercial, may be handled efficiently by an experienced operator.

Camping conditions were improved by construction of a number of tables with cupboards attached, these being highly appreciated by all fortunate enough to secure them from the necessarily limited supply available this season.

Educational work made possible for the first time by an allotment for a park ranger-naturalist was successfully inaugurated and the camp-fire center and platform rebuilt and improved at a more suitable location.

WEATHER

A remarkably open fall and winter until early in January was followed by increased precipitation which brought the figures to practically those of the preceding season. Spring weather, during May especially, was cold and disagreeable, seriously affecting travel, but the autumn was so dry that a small forest fire developed near the south boundary only a day or two before Christmas.

TRAVEL

Park visitors recorded this year totaled 43,547 as compared with 44,783 last season, a loss of 2.7 per cent; the figures being necessarily low owing to lack of checking personnel for service at even the main entrances excepting during the season of heavy travel. Winter travel was not encouraged in compliance with the request of State forces engaged in the construction of the Kings River Highway.

The number of cars and visitors in developed camp grounds for the 1930 season is shown to be 839 cars and 2,665 people for the season. Shortage in figures as compared with facts, due to insufficient checking force, is not so apparent in the case of campers, as these are not much in evidence until the rush of summer travel is at hand, when a more or less complete checking force covers all but one of the entrances. There is, however, a very considerable discrepancy in other classes of visitors, the west entrance being heavily used nearly every season prior to the opening of the checking station there.

Semilocal travel from San Joaquin Valley points was seriously curtailed by the financial uncertainty associated with the so-called grape drive there, the ranchers being too short of money to travel on vacation.

Out-of-State travel is recorded for 453 cars and 1,613 people, representing 43 States and Territories and 1 foreign country.

BUILDING MAINTENANCE AND CONSTRUCTION

Maintenance.—Minor improvements to crew quarters included roofing of tent platforms, partly walled by lumber, avoiding necessity of replacement with tentage at loss in economy. Changes in the administration building were made to accommodate the fire dispatcher and telephone operator's desk and modern switchboard and soundproof booth donated by telephone interests.

New construction.—A small annex to the headquarters office building was built from a special allotment of construction funds, affording room for much-needed expansion here. The post office, formerly in a corner room of the main building, is now housed in the new addition, to the great betterment of the service in both branches.

A new comfort station at the Grant Grove of Big Trees, in process of construction, will provide accommodations sufficient to take care of visitors, who are here far removed from the public camp grounds. A portion of the cost, in amount \$400, is being borne by the public-utility operators as a means of replacing smaller units of the same character, built by the service, but now included within the limits of the company lease.

PROTECTION

A slight increase in ranger protection service was had, owing to the employment of a ranger-naturalist in addition to the small force with which travel checking and information have been handled in the past. Nature hikes under the direction of the ranger-naturalist may be considered a patrol of a sort, and this feature has given us most of the patrol service possible under present limitations of personnel. However, no major infractions have so far developed other than wholesale climbing over the Grant and other Big Trees, to which numerous footprints inside the protective railing bear witness.

Two small fires only were fought within the park, although park crews cooperated on several occasions in handling national forest fires in adjoining areas.

RANGER NATURALIST AND MUSEUM SERVICE

A fine start has been made this season in this educational feature. Mr. Fred Klyver, of San Mateo Junior College, conducted the nature hikes and museum and camp-fire programs during July; Mr. Basil E. Jamison, of Porterville Junior College, slated for the position, being obliged to attend summer sessions at Berkeley during the early part of the season. Ranger-naturalist Jamison assumed charge August 10, and the season closed in the first week in September with a total of 18 nature hikes and 18 camp-fire programs upon the record. The average attendance upon trail trips was 32.3 persons. At camp fires several hundred people per night enjoyed the musical and other features provided, the record attendance on a night in July being estimated at 750 people.

As a historical feature of interest to park visitors, an old log cabin built in 1872, but removed to a point near headquarters by the military authorities formerly in charge of the park, will be returned to its original location near the Grant Grove of Big Trees and used for exhibition purposes in connection with the educational programs.

THE NATION'S CHRISTMAS TREE

Unfavorable weather in the valley on Christmas Day of 1929 cut down the attendance at the ceremonies, although roads were open and in fair condition, with mild temperature. However, 113 cars, carrying 473 people, reached the foot of the General Grant Tree on this occasion.

PARK ROADS

Of the total of 10.3 miles of primary roads in the park, 8.6 miles were oiled the past season, the remaining mileage, lying mostly on the North Grove Loop, being improved somewhat by widening and regrading. The Rocking Rock Road, most popular drive in the park with the exception of that to the Grant Grove of Big Trees, was widened, regraded, and oiled, but more work must be done upon it before the control can safely be removed.

Of the secondary roads, 5.8 miles in length exclusive of some old grades opened for emergency use only, 1.6 miles have been closed to motor travel by

visitors, pending improvement and probable opening of desirable camping areas reached by them. This section is proving a popular riding and hiking area, affording means of access to the Dark Canyon and upper falls of Sequoia Creek.

KINGS RIVER ROAD

Report as of July 31, latest available at time of writing, shows $1\frac{3}{4}$ miles rough grading 97 per cent complete; $7\frac{1}{2}$ miles in all 85 per cent or better completed. Heavy rock work being handled by two shovels over a distance of 1.4 miles, not finished. Drilling and shooting in advance of shovels, 0.1 mile. Right of way cleared 50 feet wide one-half mile further. Average number freemen employed, 28; convicts, 111. Survey crew now in gorge of South Fork, several miles in advance of construction.

PARK TRAILS

Owing to slightly increased allotment for trail maintenance this season, it is expected that all the long-neglected trails of the park will have been opened and partially regraded by the close of the travel year, making them at least safely passable for visitors either afoot or in the saddle. Approximately one-fourth mile of new grade is found necessary to tie in trails obliterated by sewer construction at a date later than that of the original trail building. Owing to shortage of funds, this will necessarily be of lower standard than the original wide trails now being cleared of the thickets and logs covering them.

FIRE PREVENTION

Firebreaks constructed last year were fully opened and recleared early in the season, and building of additional protection along the lines of this fire plan is proceeding steadily, the areas of extreme hazard being fairly well protected at time of writing. Another season should see the completion of the firebreaks, so that this form of protection could then be put upon a maintenance basis.

Construction work is progressing upon the cooperative fire tower being built under direction of the Forest Service on the southern extremity of Park Ridge. A new service road from the Rocking Rock parking ground to the tower site, built by park and national forest funds, will facilitate freighting of material to the site and be of great value in later maintenance and operation.

WILD LIFE

No changes in wild life are noted, excepting that deer and other animals are showing increasing tameness as the full protective effect of the game preserve surrounding the park is felt. Deer are estimated at 150 in the park. No bears nor lions may be considered as permanent residents for the travel season, but these animals occasionally pass through.

PHYSICAL IMPROVEMENTS

Within the park area of approximately four square miles, or 2,536 acres, are found the following: Roads, 16.1 miles; trails, 13 miles; telephone lines, 5.5 miles; sewer lines, 2 miles; water lines, 7.5 miles; buildings, 4; comfort stations with flush toilets, 7, exclusive of 2 on lodge grounds; pit toilets, 11; camp grounds, 5; camping sites partially developed, 450; small lighting unit supplying grounds and buildings at administrative and industrial areas and community camp-fire site.

GLACIER NATIONAL PARK

J. ROSS EAKIN, Superintendent, Belton, Mont.

GENERAL STATEMENT

Weather conditions during the past year have been ideal for tourist travel. Nevertheless, there was a marked decrease in rail travel to the park, due no doubt to abnormal economic conditions prevailing throughout the country. The increase in automobile travel over last year is in some measure due to the

opening of the Roosevelt Highway along the southern boundary of the park early in July.

Satisfactory progress has been made in all activities.

TRAVEL

The number of visitors entering Glacier National Park by all modes of travel during the past year is an increase of 4.3 per cent over the number visiting park last year. There was a decrease of 13.9 per cent in rail travel and an increase of 20.8 per cent in motor travel over last year.

Total season travel by entrance gateways, 1930 and 1929

Gateway	Visitors by rail	By automobile		By motor cycle		Miscel- laneous, foot, and horse- back	Visitors by boat	Total
		Cars	Visitors	Cars	Visitors			
1930								
Belton		8,155	27,445	7	9	24		27,478
Polebridge		647	2,254					2,254
Two Medicine		3,500	11,718	2	3			11,723
St. Mary		2,205	7,344			16		7,360
Sherburne		2,732	8,937	7	14	52		8,955
Waterton						1	3,895	3,896
Belly River						146		146
Bus, east side	6,906							6,906
Bus, west side	1,750							1,750
Out of season		1,061	3,260	2	2			3,265
Total	8,656	18,300	60,958	18	28	239	3,895	73,729
1929								
Belton		6,569	23,037	5	5	123		23,174
Polebridge		265	783			3		786
Two Medicine		2,975	10,049	4	4	21		10,059
St. Mary		1,688	5,588	1	2	122		5,703
Sherburne		2,486	8,308	2	3	71		8,362
Waterton						984	9,589	10,573
Belly River						354		354
Bus, east side	9,533							9,533
Bus, west side	523							523
Out of season		325	1,640					1,640
Total	10,056	14,308	49,405	12	14	1,678	9,589	70,740

Comparison of rail figures of this season and last year

Entrance	1929	1930	Gain	Loss
East side.....	9,533	6,906		2,627
West side.....	523	1,750	1,227	
Total.....	10,056	8,656		1,400

Automobile visitors (exclusive of motor-cycle and out-of-season travel)

Entrance	1929	1930	Gain
Belton.....	23,037	27,445	4,408
Polebridge.....	783	2,254	1,471
Two Medicine.....	10,049	11,718	1,669
St. Mary.....	5,588	7,344	1,756
Sherburne.....	8,308	8,937	629
Total.....	47,765	57,698	9,933

Camp-ground visitors during 1930 season

Camp ground	Cars	Camper8
Two Medicine.....	1, 123	3, 536
Avalanche.....	568	1, 687
Many Glaciers.....	1, 090	3, 476
St. Mary.....	726	2, 311
Total.....	3, 507	11, 010

CAMP GROUNDS

Several hundred dollars were available early in the spring of 1930 for camp ground development. This entire sum was spent on Avalanche Camp Ground in cleaning up additional areas for camping purposes. The entire road system in Avalanche Camp Ground has been cut out and a start made in building the roads. Several thousand dollars will be necessary in some future allotment before satisfactory clean-up can be expected.

Roes Creek Camp Ground.—An allotment of \$9,300 was received for the development of Roes Creek Camp Ground. The first work to be accomplished was the construction of a water system which involved the laying of 2,100 feet of 4-inch galvanized-iron pipe so that a pressure of 60 pounds was secured at the camp ground. Several laterals of 2-inch and $\frac{3}{4}$ -inch size were laid from the 4-inch main, giving the camp ground an adequate supply of pure water taken high up on Roes Creek. Besides the water system the balance of the money allotted will be spent in laying out roads and trails throughout the camp-ground area.

Our camp-ground registration figures for this season show that the camp grounds in Glacier accommodated this season 3,507 cars and 11,010 people, an increase of 10.8 per cent over last year.

ROADS

All road construction in the park was handled by the Bureau of Public Roads. The following was accomplished during the past year:

The construction of the last 4.6 miles of the Babb-Many Glaciers Road was begun June 10 by A. R. Douglas, who was low bidder on this work.

A contract was let for clearing of the right of way on the 8 $\frac{1}{4}$ miles remaining of the Transmountain Highway. This work will be carried on throughout the late fall.

The Swiftcurrent Bridge was completed the early part of June by Bureau of Public Roads forces. A gauging station on Swiftcurrent Lake was also added to the force account work done by the bureau.

While the Theodore Roosevelt Highway is not a park road, it is one of great importance to Glacier Park. The last two contracts on this road were completed by July 20, thus giving us an east-and-west road on the south boundary of Glacier Park, which has increased our automobile travel greatly. This road has been under construction for the past nine years.

Late in the fall \$500 was received from unallotted roads and trails funds for opening ditches through slides along the Babb-Many Glaciers Road constructed the year before. A new gas shovel is badly needed by Glacier Park in order to take out the many slides and open drainage ditches on the Babb-Many Glaciers Road.

Clean-up along Lake McDonald.—There was allotted \$4,000 late in the fall of 1929 to begin a thorough clean-up along the road adjacent to Lake McDonald. This work was continued until a heavy snowstorm closed it down on December 4. In April the work was continued, and the entire appropriation spent by June 1. An additional \$4,000 allotment was received and the clean-up continued until June 10, when it became too dry to burn without running the risk of starting a forest fire.

Road widening.—An allotment of \$1,000 was received late in the fall of 1929 for widening a dangerous rock cut on the Transmountain Highway near the

foot of Lake McDonald. When this work was completed the last 1-wa piece of road from headquarters to Logan Pass was eliminated. This work was accomplished by lowering the grade of the present road from 1 to 6 feet and using the material thus obtained to widen the present road, making a good road 24 feet in width over a distance of a thousand feet.

Post construction.—There was allotted \$10,000 for the operation of the Osgood shovel purchased last year by Glacier Park for the removal of slides and betterment work along our many miles of roads. The 1929 allotment was exhausted in March, but a new allotment was received early in May and the work was continued throughout the summer with a great deal of benefit to the road system. After removing slides along the Transmountain Highway and opening the road to Logan Pass, the shovel was shipped to Glacier Park station, where it continued work in removing slides along the Blackfeet Highway and the Many Glaciers Highway. This work was continued until the \$10,000 allotment received in May, 1930, was exhausted.

Roadside clean-up through 1929 burn.—The \$12,000 allotted for clean-up of an area 150 feet in width on each side of the road through the 1929 burn is now being used. This work will continue as long as weather permits.

Road oiling.—The oiling of the roads in Glacier Park began on July 15. A quarter of a gallon of oil per square yard of surface was spread in two coats for the elimination of dust. Our dustless roads have caused much favorable comment.

Landscaping and planting.—There was allotted \$1,500 for landscaping and planting of abandoned roads in Glacier Park. This work was done under the supervision of Landscape Architect Davidson. The abandoned roads in the vicinity of Many Glaciers Hotel were scarified, fertilized, and planted to grass and shrubs.

Glacier has 188 miles of road. The Blackfeet Highway and spur roads in the park total 97 miles. The balance of 91 miles is on the west side of the park 34 miles from the entrance to the summit of Logan Pass, and 57 miles of low-class road up the North Fork Valley, service roads at headquarters, etc.

TRAILS

Work on the Ptarmigan Wall Trail continued until late in October during the fall of 1929, when a heavy snowstorm drove the crew out and work was discontinued until spring. In early June a crew was put to work on the north side of Ptarmigan Wall, where heavy cliff work was encountered. This crew continued throughout the summer to blast out the cliff, and reached the mouth of Ptarmigan Wall Tunnel late in September. The trail is 6 feet wide and carved from perpendicular cliffs, it sometimes being necessary to make a cut of 60 feet in height on the upper side in order to obtain a trail width of only 6 feet. One can look a thousand feet below to the beginning of the talus slide which runs for at least a thousand feet more before the tree-covered flat at the head of Lake Elizabeth is reached. A solid masonry guard rail is under construction along this entire length of trail. A tunnel 200 feet in length was completed on September 15, 1930. This is the longest tunnel on any trail in any of the parks in the United States.

A trail running along the south shore of St. Marys Lake, which has been worked on for the last three years by Eagle Scouts from all over the United States, was completed during the summer and makes the connection between Red Eagle Lake and Going-to-the-Sun Chalets complete. About 3 miles of this trail was constructed by Eagle Scouts during the four summers they have been working in Glacier National Park. The balance of the 7 miles was constructed by force account and was completed late in September. This will complete the Inside Circle Trail trip and will allow tourists to complete the journey on horseback rather than disband at St. Marys, as has formerly been necessary, and reorganize again at Going-to-the-Sun Chalets, where different horses and guides are secured, which is always unsatisfactory to horseback parties.

Two crews have been working during the summer on the reconstruction of the Gunsight Pass Trail. When completed this trail will eliminate the steep switchbacks, which have always been a source of great expense in maintenance. The new trail also eliminates almost 700 feet of unnecessary height and misses three bad snow banks which have heretofore caused a great deal of trouble and a few serious accidents.

A short trail, three-eighths of a mile in length, was constructed from the Flattop Trail to the wall overlooking Sue Lake.

A trail crew was put into the Waterton Lake district the latter part of May to complete the trail begun last summer from Flattop Divide to Waterton Lake. This trail was completed on July 15, with the exception of burning brush, which can not be done until fall rains eliminate the fire hazard of such operations. Burning of brush and construction of drainage ditches was completed late in September. The trail follows along the side of Cathedral Peak, giving a fine view of the surrounding country, and takes the place of the old trail which followed along the bottom of the valley through the timber, where no view of the surrounding country was possible.

The trail to Sperry Glacier was finished August 15. This trail is a little over 2 miles in length, and allows horseback parties to ride within easy walking distance of Sperry Glacier. A stone stairway was built up the face of the cliff, 60 feet in height, with a handrail so that an easy ascent to the glacier is possible.

Glacier has at this time 422 miles of tourist trail, 227 miles of boundary trails, and 192 miles of fire trails—841 miles in all.

BUILDINGS

The Mount Brown Lookout was completed during the late fall of 1929. The Apgar and Loneman Lookouts, which were burned down during the fire of 1929, were rebuilt before July 1, 1930. A barn at Two Medicine Ranger Station was constructed before July 1. A checking station at Two Medicine and one at Sherburne Lake were built during the summer of 1930.

The addition to the warehouse at administrative headquarters was completed in August.

Two comfort stations, left over from 1929 building program, were constructed at Avalanche Camp Ground.

Shower and laundry buildings were constructed at Avalanche Camp Ground, Many Glaciers Camp Ground, and Two Medicine Camp Ground.

All buildings at the North Fork Ranger Station site were burned during the fire and were rebuilt by contract during the summer of 1930. These buildings consist of a ranger station, a barn, a fire cache, and a woodshed.

The fire cache at Many Glaciers was built during the summer. Barns were built at Paola and Kennedy Creek Ranger Stations. Woodsheds were built at Kennedy Creek, Fish Creek, and Lake McDonald Ranger Stations. The nowshoe cabin at Lincoln Creek, which burned during our forest fire, was rebuilt, together with a cabin on Quartz Lake and Cameron Lake. These nowshoe cabins were built by contract, ranging in price from \$450 to \$650. An equipment shed was constructed at Belton by day labor. The construction of the assistant superintendent's residence at headquarters is well under way.

TELEPHONES

Glacier's telephone system consists of 167 miles of telephone line, extending from park headquarters up the North Fork to Kishenehn Ranger Station; from Polebridge across Browns Pass to Waterton Ranger Station; to all ranger stations and fire lookouts on the west side. A leased circuit on the Great Northern right of way connects park headquarters with the administration building at Glacier Park. Stub lines connect all ranger stations and fire lookouts along the southern boundary of the park to this line. A switch at Glacier Park connects this line with the Glacier Park Hotel Co.'s telephone system on the east side. The two adjacent national forests have connections with all our lines, thus increasing fire protection.

EDUCATIONAL ACTIVITIES

The 1930 staff of ranger naturalists comprised six men, three stationed at Many Glaciers, one at Going-to-the-Sun, one at Two Medicine, and one at Lake McDonald.

The greatest advance made by the educational division was the establishment of naturalist service in auto camps at Many Glaciers, Two Medicine, and Avalanche Creek. Three lectures were given weekly in the camp ground at Many Glaciers; four were scheduled per week at Two Medicine; two per week at Avalanche Creek near the close of the season.

All-day trips were instituted at Many Glaciers. Favorite destinations were the summit of Altyn Mountain, Appekunny Cirque, Grinnell Glacier, Grinnell Lake, Iceberg Lake, and Cracker Lake.

For the first time a naturalist has been stationed in the Two Medicine district. The service here has received very encouraging results. The management of the chalets has always been especially desirous of cooperating with the naturalist stationed there.

People reached on 420 field trips during the past season numbered approximately 5,000; people reached by 260 lectures numbered approximately 14,000. It is estimated that approximately 20,000 people availed themselves of the cut flower and rock exhibits which were maintained in the lobby of Many Glacier Hotel, at Two Medicine Chalets, at Going-to-the-Sun Chalets, at St. Mary's Chalets, and in the lobby of Lake McDonald Hotel.

Three American Nature Association parties visited the park during the past season, two traveling the North Circle, one traveling the South Circle. A naturalist accompanied each of these. Parties were small this year, owing, undoubtedly, to economic conditions in the East. On various other occasions a naturalist was detailed to lecture or guide special parties visiting the park.

Special lectures were given to the chauffeurs of the Glacier Park Transport Co., at the fire-training school, and on other occasions.

Fifty-seven hundred copies of Nature Notes from Glacier National Park (12 numbers, totaling 110 pages) were mimeographed and distributed by the Educational Department during the past year.

Texts for 200 signs were prepared for self-guiding trails. Trails were laid out as follows: Around Swiftcurrent Lake; from Lake McDonald Hotel to Fish Lake; from Lake McDonald Hotel to Johns Lake; from Avalanche Creek campgrounds to Avalanche Lake.

INSECT CONTROL

In September, 1929, Mr. Donald DeLeon, of the Coeur d'Alene Entomological Laboratory, made an investigation of forest insect conditions in Glacier National Park. In early May and again in September, 1930, James C. Evenden, in charge of the laboratory, also visited the park.

A \$4,000 campaign against white-pine bark beetles (*Dendroctonus monticolae*) was conducted in Glacier National Park last spring. Clean-up was made in the areas adjacent to Mineral Creek, the Transmountain Highway, and the Fish Lake and Sperry Trails. Untouched because of the lateness of the season and insufficiency of funds were other badly infested areas, especially that lying along Spruce Creek at the foot of Lake McDonald. Very severe has been the devastation by the Douglas fir beetle, not only in Glacier Park but also in the surrounding national forest. It is the opinion of the park naturalist that \$100,000 would be insufficient to make a complete clean-up of this pest.

FISH PROPAGATION

We have planted to date the following number of fish:

90,000 native trout (eyed eggs) in Camas Lake.

90,000 native trout (eyed eggs) in Grace Lake.

38,700 eastern brook fingerlings in Middle Two Medicine Lake.

515,400 rainbow fingerlings.

722,750 native trout fingerlings.

The rainbow fingerlings were planted in the Many Glaciers Valley and the native trout in McDonald Lake, Avalanche Lake, McDonald Creek, Red Eagle Lake, and Upper St. Marys Lake. The grand total of all fish handled during the year will be 1,276,850 fingerlings and 180,000 eyed eggs. The figures on the fingerlings are approximate because there will be a slight loss during the transportation of the fish from the hatchery to the location of planting.

ANIMALS

During the year the wild life came through in good shape, and there would have been but small loss if it had not been for the number of deer killed by trains on the Great Northern track near Belton and the number of elk killed by Indians on the Blackfeet Reservation, when the weather conditions drove them from the park.

During the past 10 years the elk herd in St. Mary Valley has been nurtured until it numbered approximately 125 head. Last winter heavy chinooks, followed by extremely cold weather, coated the snow with a crust sufficiently thick to withstand the weight of a full-grown bull elk. The animals being unable to obtain feed were forced to drift out on the Blackfeet Reservation, where they were recklessly slaughtered by the Indians, so that perhaps only 10 per cent survived the winter. It is said that half-breed merchants sold elk meat over their counters.

The mountain sheep and all wild life other than deer and elk came through in fine shape with but very small loss.

The following game count made during the year covers the amount of game, the number fed, and the loss of game from various causes. With the exception of one or two localities, the coyote is not in sufficient numbers to be a serious problem.

Actual count of animals is: 34 moose, 471 mule deer, 915 whitetail deer, 52 sheep, 138 goats, 18 silvertip bears, 94 black and brown bears, 337 elks, 3 martens, 23 minks, 6 lynx, 10 otters, 77 beavers; predatory animals: 142 coyotes, 2 wolves, and 1 mountain lion.

Six sheep and 98 deer were killed by coyotes. Out of the deer lost, it is believed that many winter kills, the carcasses eaten by coyotes, are included. One deer was killed by a wolf; 40 deer, 3 elks, 6 sheep, and 3 goats died from natural causes; 85 deer were killed by trains.

Forty-nine sheep, 545 deer, and 136 elks were fed during the winter.

ELIMINATION OF PRIVATELY OWNED LANDS

After years of discussion and efforts to secure necessary funds, a gratifying start has been made toward eliminating privately owned lands in the park. An allotment of \$198,000 which could be expended upon a 100 per cent basis upon condition that it be eventually matched, has been used toward clearing up the situation at the foot of Lake McDonald. This section is the most unsightly and has caused the park the most complications. About 60 per cent of these lands have been acquired. Further funds will be needed to clean up this section alone. With this splendid start it is hoped enough funds will be secured soon to purchase all privately owned lands in the park.

ARRESTS

During the year 74 complaints were filed and 69 convictions secured, the fines aggregating \$445. Four defendants were found guilty of possession of firearms in the park, 2 of wounding and killing wild animals in the park, and 63 of violations of motor-traffic regulations. Fines ranged from \$1 to \$100 and a 30-day suspended jail sentence.

ACCIDENTS

No serious accidents occurred during the year.

FIRE PROTECTION

To date this year 87 fires have been reported from lookouts and other sources—33 inside the park and 54 on forest and private land outside.

A training school for the prevention, detection, and suppression of fires was held June 2, 3, and 4 at Belton headquarters and June 8 and 9 at St. Mary Ranger station. The purpose of the school was to teach by demonstration and instruction certain phases of fire control now in use by different fire-suppression organizations throughout the Northwest. About 84 men attended these training schools.

There were 5 regular lookouts, 19 fire guards, 2 dispatchers, and a fire chief employed in the fire organization during the season of 1930.

There has been a trail built to the summit of Elk Mountain and a temporary lookout built there. Fire trails have also been built on Anaconda Creek, Dutch Creek, from Mineral Creek up east slope of Heavens Peak to timberline, on Ole Creek, from Park Creek to Roosevelt Highway, from Coal Creek to Roosevelt Highway, part way from the North Fork Road at McGee Meadow to Huckleberry Lookout, from Logging Lake up valley above Grace Lake, and from snowshoe cabin on Coal Creek up Coal Creek to Surprise Pass into Nyack

Creek. All of these trails are for fire protection, either to lookouts or to get into heretofore inaccessible places.

Two new lookouts have been installed this year—one at Granite Park Chalets, which is operated by the porter at the chalets through the courtesy of the Glacier Park Hotel Co., and one on Elk Mountain near Fielding Ranger Station.

Inspection trips have been made by Fire Control Expert Coffman and Fire Chief Paige to determine the best points to install lookouts in Many Glaciers, Sun Camp, St. Marys, Two Medicine, Belly River, and Waterton districts.

RECOMMENDATIONS

Moderately priced housekeeping cabins and lodges at our public automobile camp grounds are Glacier's most pressing need at this time. The only facilities now available to motor tourists at our camp grounds are camping space, wood and water, comfort stations, and in three camp grounds are showers and laundries. The lack of overnight cabins will very adversely affect our automobile travel, and there was during this year a strong demand for them. It is hoped that a modern cabin layout will be available for next season.

GRAND CANYON NATIONAL PARK

M. R. TILLOTSON, Superintendent, Grand Canyon, Ariz.

TRAVEL

Weather conditions ideal for automobile travel prevailed from the beginning of the travel year until January. The days were almost without exception clear and warm, and approach roads as well as feeder routes were in excellent condition. Until the 1st of January there was an increase of approximately 40 per cent in automobile travel and a small increase in rail travel as well. General snowstorms, which started in on the 7th of January and prevailed throughout the northern half of the State, effectually blocked all roads from the eastern to the western boundary of the State for several days. The South Approach Road was closed from January 11 to 17 and 20 to 22, and conditions subsequently were generally unfavorable for automobile travel.

There were snowstorms as late as May 17. A sharp decline in all modes of travel resulted. In spite of this fact, however, total auto travel for the season showed an increase of 1,714 cars and 3,845 passengers, or 3.34 per cent. Rail travel, on the other hand, consistently showed a loss from January until the end of this travel year, there being a total loss of 14,870 people, or 21.8 per cent, which more than offset the gains from other means of travel, so that there was a net loss for the travel year of 11,330 visitors, and 6.16 per cent, all of which was represented in travel to the south rim, there being a gain of 705 visitors, or 3.3 per cent, in travel to the north-rim section of the park. The loss in rail travel is accounted for to a considerable extent by the fact that in the previous year there were several thousand visitors coming to the park by rail en route to and from national Shrine and Elks conventions on the Pacific coast. Undoubtedly the general business depression prevailing throughout the country during practically the whole of this travel year is responsible for the remaining losses, as well as preventing the substantial increase that had been anticipated at the beginning of the year.

Auto visitors represented every State and Territory in the Union, the District of Columbia, Alaska, Panama, Canal Zone, Hawaii, Philippines, and 10 foreign countries. The following is a summary of travel by all modes of transportation for the year:

	By automobile		By rail	Miscellaneous	Total
	Cars	Passengers			
South rim.....	33,618	100,179	49,890	611	150,680
North rim.....	5,954	18,739	3,331	13	22,083
Total.....	39,572	118,918	53,221	624	172,763

WEATHER

Unusually fine weather conditions prevailed until January 7, when severe winter storms set in. The total snow fall for the winter was 50 inches, of which 25½ inches fell in January and 15¼ inches in May. The maximum temperature of 92° F. occurred on July 5 and a minimum of -5° on January 21. The months of January and May showed excessive negative departures in temperature and the intervening months positive departures from normal. The month of June was approximately normal. General rains set in on July 6 and continued intermittently throughout that month and August. The rains were of great benefit to the range but acted as a deterrent in auto travel. The ranges in Grand Canyon National Park and generally in Arizona are in the best condition of many years. The herbage and shrubs show an almost luxuriant growth and earthen tanks are practically all filled with water.

ROADS

Road work was unusually active under the impetus of a total allotment of \$627,000, the largest ever granted the park. It is fortunate that Grand Canyon National Park received such favorable consideration at this time in the allocation of roads and trails funds on account of the fact that unusually low bids were obtained on contract work. There was keen competition in all bidding and low bids were in all cases equal to or considerably lower than the engineers' estimates. By taking advantage of the contracting situation we have been enabled to secure contracts at excellent prices. Work performed on major projects under the supervision of the Bureau of Public Roads included the following:

Grandview-Desert View Road.—Subgrade reinforcing material consisting of pit and quarry calcareous sandstone laid 4 to 8 inches in depth was placed on the section of the road from Grandview spur to the end of the project at Desert View. This work not only made the road passable throughout the winter, except when blocked by heavy snow, but also forms the base for the oil process paving to follow. The work of quarrying, loading, and hauling was handled by contract and the spreading by hired labor. It was finished in December.

Bids were opened in this office on June 24, for oil process surfacing of the Grand Canyon-Grandview-Desert View Road to Desert View and the Yavapai, Yaki and Grandview Point spur roads. Award of contract was made to Lord and Bishop, who submitted the low bid of \$113,949.55. The contractor moved in and began setting up his plant at the quarry and other preparation work in July and by the middle of August began active operations. It is expected that the work will be completed before weather conditions force a shut-down this coming winter. The total length of the job is 18.58 miles.

South Approach Road.—A contract was awarded in September, 1929, and work completed in December for the grading of section C of the South Approach Road. This project is 7.17 miles in length and continues the graded new road to a point south of Howard Lake, 35.17 miles from the park boundary.

Bids were received on June 7 and contract awarded shortly thereafter for the grading of section D, 17.57 miles from the end of section C to the junction of the South Approach Road with United States highway No. 66, approximately 2¾ miles east of Williams. The contractor commenced work the same month and will carry it forward to completion on about the first of December. Subgrade reinforcing material was placed on the South Approach Road from the park boundary to the end of section C. The work was handled by contracting for quarrying, loading, and hauling of the material and the spreading was done by hired labor. It was completed in December. Crushed rock was used for the major portion of section A and pit gravel for the remainder. With the placing of this material the road became an excellent, fast, all-weather highway.

Bids were received and contract awarded in August for the subgrade reinforcement of section D. The work will be so programmed as to proceed as fast as the new grading is finished so that the total job will be completed immediately after completion of the grading.

Government maintenance by park forces and equipment, under Bureau of Public Roads supervision, continued on the South Approach Road. The constructed portion of the road was maintained generally in excellent condition throughout the year. The old road from Williams to the junction of the

constructed section was kept generally in good condition, except immediately following rains and snows.

Bright Angel Point—Point Imperial—Cape Royal Road.—Grading of this road was completed on October 31. The work was performed in a most excellent manner by balancing quantities of excavations and fills so that borrow pits were not necessary. Bids were received and contract awarded in December for oil-process surfacing of the road. However, on account of late snows the contractor was not able to move in until the 1st of June, and this season's work consisted only of establishing quarry and plant and placing of base rock. This being a 2-season job the project will not be completed until some time next year. Length of the project is 25.85 miles.

North Entrance Road grading.—Bids were received and contract let in December for the grading of the North Entrance Road from the north park boundary to its junction with the Bright Angel-Point Imperial Road. Although the contractor was not able to begin work until June, the work progressed rapidly and was completed by the latter part of September. Length of project is 9.97 miles. The same landscape features are being observed on this job as on the Bright Angel-Point Imperial Road. Amount of contract, \$73,942, was 24 per cent under engineer's estimate.

The following were the minor projects performed under National Park Service supervision by day labor:

Post construction and clean-up.—An additional allotment for this work having been included in this season's project, clean-up of debris resulting from construction of the road to Desert View was resumed in July and by the end of the season had been carried nearly to completion. On the north rim some clean-up work was done in the way of removing old fences and buildings from alongside the road and by the obliteration of old roads.

Spurs to Moran Point and Cliff-dwelling View.—The spur to Moran Point was approximately 1,700 feet long, including the loop at the end. The work consisted of grading and of subgrade reinforcement at a total cost of \$2,653.30. The other spur was a short loop of some 500 feet providing a turnout to a point from which a cliff dwelling is visible below the rim. The cost of this project aggregated \$1,000.

Parapet wall at Hopi Point.—A parapet wall 74.4 feet long, 15 inches wide, and 2 feet high was erected on the rim at Hopi Point as an additional stopping place for sight-seeing automobiles and busses.

Point Sublime Road improvement.—With a total allotment of \$7,500, including the purchase of necessary machinery and equipment, considerable improvement work was performed on the road to Point Sublime, consisting of drainage structures, realignment in places, and grading, excavation, and fills wherever necessary in order to make a passable road under favorable weather conditions.

Supai Road.—In cooperation with the county of Coconino, which furnished \$200 for work on the Supai Road outside the park, the road was graded lightly throughout its entire length with heavy work concentrated in the worst sections. By this work the road was placed in reasonably good condition, the best it has been in many years.

In addition to road work in the park this season there was the initiation of major projects under State and National Forest funds which have an important relation to the park. Location surveys were completed last year on the section of US Highway 89 from Cameron to Jacob's Lake, via Lee's Ferry bridge. The State has allocated approximately a half million dollars for grading and surfacing that section of the road from Cameron 40 miles north to Cedar Ridge. A total of \$275,000 from Forest Highway, State, and Federal aid funds has been allocated for construction of the 5-mile section from the top of Buffalo Hill to Houserock Valley. Work is in progress and nearing completion on the short section of road from Fredonia north to the Arizona State line, connecting with Utah's modern highway to Salt Lake City. The State of Arizona has also programmed a considerable amount of funds for the improvement of the transcontinental highway US 66. The unpaved section of the road between Flagstaff and Winslow is now being paved and will be completed this year. Location surveys have also been made for realignment of the portion of the road between Ashfork and Flagstaff.

The most important accomplishment so far as the park is concerned is the placing on the 7 per cent system of a connecting route between the eastern park boundary and Cameron, tying into U. S. Highway 89 at the latter point. A three-cornered agreement, executed last spring between the National Park Service, the Forest Service, and the State Highway Department of

Arizona, provides the necessary funds for making a location survey for this route. Bureau engineers made a preliminary reconnaissance last fall and now have a large crew in the field making a definite location survey.

TRAILS AND PATHS

On receipt of an allotment of \$20,000 for the reconstruction of Bright Angel Trail survey was immediately made and work begun on November 11, for the reconstruction of the lower section of the trail from Indian Gardens to the bottom of Pipe Creek Canyon. The new trail follows Garden Creek through lower Indian Garden and eliminates the dangerous "corkscrew." This section was completed in July and an additional allotment of \$20,000 has recently been made available for the reconstruction of the upper end on which it is planned to start work about the first of October.

A footpath, 2,050 feet long, was constructed from the loop of the Cape Royal Road to the extreme point. A similar footpath, 290 feet long was constructed at Point Imperial. When the contractor starts his oil mix plant next season it is planned to purchase material for the paving of these paths.

A 476-foot section of trail, replacing a board walk, was constructed from the western end of the Yavapai footpath west to a point near El Tovar Hotel.

During the year there were constructed approximately 8 miles of the bridle path from Bright Angel Point toward Point Imperial and 9 miles of the bridle path toward Powell Plateau.

Coincident with the abandonment of Hermit Creek camp, maintenance of the Hermit Trail was discontinued on August 15.

At the request of the Indian Service the park engineer made reconnaissances and surveys to locate a new trail from near Manakaja Point down to Havasupai Indian Agency. No route could be found over which an inexpensive trail could be constructed so the small amount of money available by the agency was expended in improvement of the existing trail.

CAMP GROUNDS

In spite of the fact that automobile travel increased only slightly the camp grounds were used by a considerably larger number of visitors than heretofore. The Grand Canyon camp ground was closed in December and opened for the current season in April. The Desert View camp ground was closed on September 30 and opened May 1. The north rim camp ground was closed September 30 and opened May 28. There were 15 camp fireplaces and 20 tables installed in the Grand Canyon camp ground and the grounds were enlarged by the extension of 2 streets. There were also six fireplaces installed in the north rim camp ground and an additional comfort station constructed. Records show that 54,396 visitors made use of the camp ground during the year.

PARK OPERATORS

Grand Canyon Lodge, on the north rim, was closed for last season on October 5 and opened for the current season on May 28. The Utah Parks Co. constructed 27 new housekeeping cabins, completed de luxe cabin units, constructed a garbage incinerator, a dormitory for male help, a bathhouse, and laundry in the public camp ground. A 2-family residence was also constructed at Roaring Springs to serve employees operating the hydroelectric power and pumping plant. Visitors were accommodated efficiently and I have only the highest praise for the management of the operations.

A 20-year contract was given the Utah Parks Co. for transportation service on the north rim. The service includes motor and saddle horse transportation. With the completion of the Cape Royal Road new rates for bus trips to Point Imperial and Cape Royal were established at the beginning of the season. Reduced rates were also placed into effect for the Utah Parks Co. circle tour, including the north rim of Grand Canyon and Zion and Bryce Canyon National Parks.

No new public-utility facilities were added on the south rim. The Fred Harvey Co. has available in the budget of the Santa Fe Railway Co. an item of \$50,000 for the construction of a rest house at Desert View, \$20,000 for a new paint shop, \$6,000 for a guides' house at Phantom Ranch, and \$175,000 for installation of a water system from Indian Gardens. Study is now being made to develop plans for the rest house at Desert View satisfactory to all concerned,

and working plans are now being prepared for the paint shop. During the summer season the housekeeping cabins were inadequate to meet demands and many automobile visitors desiring this type of service were compelled to go to Bright Angel or El Tovar hotels or to near-by privately operated camps.

A comprehensive 5-year development program involving some \$3,500,000 was submitted by Fred Harvey. It contemplates the construction of one large hotel to take the place of El Tovar and the Bright Angel, construction of new barns and corrals near the railroad Y and the removal of the existing barns and corrals, a subsidiary hotel and dining service unit at Desert View; and a development in Havasu Canyon as the terminus of a scenic trip. After filing this program the company submitted application for a new and more liberal long-term franchise.

The three certificates of convenience and necessity held by Fred Harvey from the Arizona Corporation Commission for passenger and baggage service between Grand Canyon and Williams, Grand Canyon and Lees Ferry bridge, and between Grand Canyon, Flagstaff, and the Indian villages were transferred to the Santa Fe Transportation Co., a subsidiary of the Harvey system. At Phantom Ranch the sewer system and a central toilet and shower building were completed in November.

On account of the fact that overnight canyon trips to Hermit Creek camp had fallen off practically to nothing, the camp was abandoned on August 15.

A 10-year contract was granted to Emery C. Kolb for operating studio, photographic, and lecture service on the south rim and the taking of photographs of canyon trail parties. The Mountain States Telephone & Telegraph Co. conducted its telephone service at Grand Canyon in a most satisfactory manner.

Scenic Airways (Inc.) discontinued operations from its flying field at Red Butte on November 1 and has not resumed operations since.

A temporary permit was issued to Dr. Basil G. Carson for medical service on the south rim pending completion of the general hospital. Doctor Carson succeeded Doctor Jones on April 1. A seasonal permit was issued to Dr. E. H. Calvert for medical service on the north rim.

BUILDING CONSTRUCTION AND MAINTENANCE

The south entrance ranger station was moved into administrative headquarters and remodeled as a residence building. A large electric refrigeration unit was purchased and installed in the headquarters mess house. The old log shack known as Uncle Jim Owens's cabin, which for many years was used as the Bright Angel ranger station, was demolished.

Construction projects included the following: South entrance checking station, gasoline station and oil house adjoining the central warehouse building, five 2-room laborers' cabins, and one 2-bedroom residence building.

Bids were received for the construction of a general hospital at Grand Canyon and contract awarded to the low bidder, George C. Walters, jr., of Flagstaff. Work was begun in July, contract time to expire December 15.

PROTECTION DEPARTMENT

The protection department was enlarged by one additional full-time ranger position and an additional seasonal temporary position.

There were two amendments to the park regulations, one relating to speed regulations and parking and the other to fishing; the latter amendment makes the State fishing laws applicable to the streams of the park and establishes a limit of 10 fish per person per day. During the 1930 season an entrance fee of \$1 was for the first time charged autos entering the north rim.

Excessive precipitation made conditions unusually favorable for fire protection. There was a total of 9 forest fires; 7 class A, 2 class B, with a total burned-over area of $2\frac{1}{2}$ acres. John Coffman, fire-control expert of the National Park Service, made an annual inspection of fire-protection facilities in October and reported that our facilities and programs were in a large measure satisfactory. The annual building fire inspection was made in June and conditions found were generally satisfactory.

A general round up of cattle was made last fall, the first aggressive round up in the history of the park. Practically all range cattle were removed from the park for the winter season. From the beginning of the summer grazing season in the park trapping of cattle within the village area has been conducted so that for the first time this area has been kept practically free of range stock.

A representative of the United States Bureau of Entomology made an inspection of the timbered area of the south rim and found only minor endemic insect conditions.

The annual burro hunting parties were in the field in February and March, the area covered being from Hermit Camp west as far as Royal Arch Canyon. A total of 77 burros were accounted for, making a grand total of 1,337 since the beginning of the extermination program. The south side of the canyon is now practically free of burros and the program is considered completed. Predatory animal control operators resulted in the disposal of 26 coyotes and 18 bobcats.

There was a total of 25 accidents recorded in the park during the year.

There was a total of 10 arrests for various offenses.

MUSEUM AND EDUCATION

The educational staff consisted of the park naturalist, five ranger naturalists, and one ranger detailed from the ranger force. The Yavapai observation station and museum was open daily throughout the year. A small museum was established in a room at Grand Canyon Lodge. A museum of natural history was established in the old administration building. Evening lectures were given at the Grand Canyon auto camp. Evening programs were instituted at Grand Canyon Lodge. The following nature guide trips were made: North rim nature walks, one trip daily during June, two trips daily thereafter; south rim nature walks, one trip daily in July and until August 25. Guided auto caravan trips were begun on the south rim on August 25 and conducted daily thereafter; the trip starting at the natural history building at 9 a. m., and ending at Desert View at 12.30. There were also many special parties from various universities and societies which were personally conducted on field trips. The following is a statement of visitors served through regular educational and museum facilities:

	Number of lectures	Persons served		Number of lectures	Persons served
Yavapai station.....	187	39, 757	South rim auto caravans.....	38	846
Natural history building.....		1, 000	South rim campfire lectures.....	98	13, 355
North rim museum.....		3, 500	North rim evening lectures.....	115	15, 525
South rim nature walks.....	35	400			
North rim nature walks.....	173	4, 145	Total.....	646	78, 528

The development of the Yavapai station was completed, under the personal direction of Senior Naturalist Hall. Dr. John C. Merriam devoted approximately a month of his time to planning the work. On the parapet to the observation porch of the building (12 copper boxes were mounted and in them placed certain exhibits arranged in such sequence and so assisted by labels and by telescopes and pointers as to constitute a self-explanatory recitation of the story of the making of the Grand Canyon, and of paleozoic and modern life. Certain features of the stories are further amplified in the exhibit room by use of transparencies, balopticons, and an automatic motion-picture machine. A series of gardens was prepared on the ground adjoining the building to demonstrate the life zones of the park. Records of the plants are being kept as a scientific study. All telescopes within the station proper being fixed, two movable battery-commander telescopes were provided just outside the building to meet popular demand.

The natural history building was developed at the old administration building by installing mounted specimens of the flora and fauna of the park. The building is also used for storage of surplus and study specimens of fossils.

The museum room in Grand Canyon Lodge is equipped with a small selection of exhibits of geology, biology, and archeology, together with suitable charts, etc. Four battery-commander telescopes were installed.

In preparation for the wayside museum of archeology to be erected at the site of the Tusayan ruin, many archeological specimens were collected. These, together with others received by donation, were catalogued and stored.

The technical, scientific, and reference library was greatly enlarged by books contributed by United States Geological Survey, Canadian Geological Sur-

vey, Arizona Bureau of Mines, Carnegie Institution of Washington, United States Biological Survey, Smithsonian Institution, Roosevelt wild-life station, and the National Academy of Sciences.

Side trails were established to canyon exhibits in place which were considered to be of exceptional value, such as fossil ferns, Archean-Cambrian, contact, etc. Signs locating and explaining these exhibits were installed.

Grand Canyon Nature Notes were published and distributed monthly to a mailing list averaging 200 names. Some prominent scientists contributed articles.

The park staff continued to cooperate with scientific organizations and other Government bureaus, and much geological material was sent out. A collection of Grand Canyon minerals was loaned for the State fair, the exhibit receiving two prize ribbons.

Under the auspices of the Carnegie Institution of Washington, Dr. C. E. Resser, of the United States National Museum, and Dr. A. A. Stoyanow, of the University of Arizona, made a trip to Nankoweap Basin to make a study of the rocks of Algonkian age.

OFFICIAL PUBLICATIONS

Last season the practice of placing the official Grand Canyon booklet of information at the hotels for distribution was instituted. This resulted in so rapidly disposing of our supply that it was necessary to discontinue this service and to restrict the issue of the booklet to automobile visitors coming from distant States and to answers to mail inquiries. In spite of this restricted distribution our supply of the 1929 circular became exhausted by the 1st of May and the 1930 folder was not received until one month later. Without doubt the circular should be placed for distribution at the hotels, since it there reaches many visitors not otherwise contacted. To accomplish this it would be necessary to increase our annual supply by at least 50 per cent.

At the request of the director's office, the sale of the National Parks Portfolio was pushed and was increased to many times over the numbers sold in previous years. The following is a statement of the sale of official publications handled in the park:

	Number sold	Value
Portfolio.....	454	\$454.00
Bulletin C.....	102	102.00
Geologic maps.....	289	45.75

ARCHEOLOGY

Permits were granted by the Department of the Medallion, a Southwest archeological society, for the excavation of the Tusayan ruin, just off the Desert View Road, near Lipan Point, and for making potsherd collections and a surface survey of prehistoric ruins. The material uncovered in the Tusayan ruin excavation was somewhat disappointing, due primarily to the fact that no burials were found.

The Medallion has offered a donation of \$5,000 for the construction of a small archeological museum at the site of the ruin. Actual receipt of the donation has been withheld pending preparation of satisfactory plans for the museum building.

WILD LIFE

Aside from the limited range area the greatest drawback to the development of wild life on the south rim is the lack of sufficient watering places. This season a program of improving range water conditions was begun, consisting of improving existing tanks and fencing the tanks against cattle and horses, and the development of additional watering places where it could be done at slight expense. The Kaibab deer herd imported to the south rim has thrived. Eight more fawns were brought across last fall, being transported by an airplane of Scenic Airways (Inc.), bringing the total of the herd up to 27. Ten more

fawns have been ordered for delivery this fall. At this writing the 1930 fawn crop of the herd is not known, but it is estimated that it will total about 10 fawns. Feeding pens for the herd were continued at the village, but the deer are seen less frequently in the village, as they are making more and more use of the surrounding range.

Dr. A. J. Pieters, principal agronomist of the Bureau of Plant Industry, made a survey of the Kaibab deer range in July with a view to determining what may be done in the way of increasing the carrying capacity. Inspections were also made by Edwin Seymour, president of the American Bison Society, and by representatives of the Arizona Game and Fish Commission and of the Forest Service. Forest Service estimates of the herd still stand at 30,000, despite heavy losses during the hunting season. Range conditions were unusually favorable this summer on account of the large amount of precipitation.

The band of antelope at Indian Gardens continued to hold its own. There were six kids born this year, of which two have been lost, presumably through predatory animals. New blood is needed in the herd, and it is planned next year to remove the old bucks and introduce new bucks.

The park received a visit from Fish Culturist F. J. Foster, who inspected both Bright Angel and Havasu Creeks. He found Bright Angel Creek well stocked and normal reproduction taking place. Havasu Creek was believed to be suitable for trout, and a plant is being arranged. There were 100,000 Loch Leven trout eggs planted in Bright Angel Creek in January, and 50,000 Black Spotted trout eggs planted in Shinumo Creek in August. Although Bright Angel Creek was extensively fished this year for the first time, the fishing there was excellent throughout the season. An inspection of Clear Creek was made and, while some fish were seen as a result of the plant made in 1928, the plant is not considered a success and will be repeated later.

Immediate results are being seen from removal of cats and dogs from the village area in the increase in numbers of birds, squirrels, and chipmunks.

SANITATION

The activated sludge plant at Grand Canyon operated continuously in a most satisfactory manner. An average of 120,644 gallons of water was reclaimed daily, at an average cost of approximately 35 cents per million gallons. Chemical and bacteriological examinations were made at regular intervals. Frequent laboratory examinations were also made of the fresh-water supply.

An exceptionally efficient garbage incinerator was constructed on the north rim to serve the Grand Canyon Lodge and Park Service facilities.

RECEIPTS AND EXPENDITURES

(Fiscal year ended June 30, 1930)

Receipts:

Auto entrance fees.....	\$33,988.00
Franchise fees for hotels, transportation, camps, and general store	21,125.18
Permit fees (grazing, etc.).....	167.91
Miscellaneous revenues (proceeds from sale of stores, services, etc.).....	401.35
Total—general fund revenues collected.....	55,682.44

Expenditures:

Annual appropriation for administration, protection, maintenance and operation.....	108,656.60
For equipment	8,782.43
For physical improvements.....	22,917.51
	140,356.54
Emergency reconstruction and fighting forest fires.....	346.38
Roads and trails	431,790.04
Donations.....	139.18
Total expenditures all appropriations.....	628,314.58

BOUNDARY REVISION

It has become more and more apparent that in order to give adequate protection to its wild life the park boundaries should be extended on both rims. At present the boundaries hug the canyon rims rather closely and do not include a sufficient scope of country and the range of feed and climatic conditions necessary for this purpose. No definite action toward extension of the boundaries has as yet been taken, but it seems quite essential that this should be done in the near future if Grand Canyon National Park is to become the wild life sanctuary that every national park is or should be. Since the problem involves present management plans of the Kaibab deer herd by the Forest Service and the State of Arizona, it is a difficult one.

LANDS

The General Land Office used as bases of exchange a total of 1,964.7 acres of school section lands within the park, reducing the total alienated holdings of this class to 24,630.96 acres. The exchange of a portion of the William Randolph Hearst property at Grandview used in connection with the construction of the Grandview-Desert View Road for park lands was effected. The General Land Office made an investigation of the validity of the mining claims of George McCormick located near the confluence of the Colorado and Little Colorado Rivers. A mining engineer of the General Land Office also made an inspection on the ground for the purpose of determining and recording monuments, assessment work, and mineral showings. It was discovered that the Hance Asbestos Mining Co. held patents on 325,827 acres of mining property along the Colorado River below Grandview. These holdings were recorded on the park status map. The property is now held by Coconino County for nonpayment of taxes. An offer was made by W. I. Johnson for the sale of his mining claims in Havasu Canyon.

VISITORS

The park received three visits of inspection from Assistant Secretary Edwards, one in November when he visited the south rim and another in July when he visited the north rim. He also visited the park in August. Director Albright arrived on the north rim with the governor's party on July 4, came around to the south rim by auto over the Lees Ferry Road July 7, spending two days on this side, and on September 19 he again arrived on the north rim with the Secretary of the Interior and Mrs. Wilbur, and Northeutt Ely, executive assistant to the Secretary. It was visited by many other prominent persons, the most notable being members of the national conference of State governors. After the general sessions in Salt Lake City the party went to Zion National Park, thence to the north rim of Grand Canyon National Park, arriving the afternoon of July 4, where the conference was terminated. The party visiting the north rim comprised a total of 161 members, representing 21 States. Other prominent visitors included President-elect Rubio, of Mexico, family, and staff; Governor Reed, of Kansas, and former Governor Pinchot, of Pennsylvania; Representative Florence P. Kahn, of California; George Horace Lorimer, editor of "Saturday Evening Post"; John D. Rockefeller, jr., and family; Alanson Houghton, former ambassador to England; Carl Gray, president, Union Pacific system; and W. B. Storey, president, Santa Fe Railway system.

GRAND TETON NATIONAL PARK

SAMUEL T. WOODRING, Superintendent, Moose, Wyo.

GENERAL

The travel year of 1930 has shown a pleasing increase in use of the park by visitors, due largely to widespread publicity during the winter and spring months and to general knowledge of the national-park status of the area. Only a carrying-on program was possible during 1929, but when the new roads and trails and the 1930-31 appropriations became available in the late spring of 1930 necessary equipment was purchased and road and trail work begun. A

permanent clerk was added to the force on June 15, which brought the permanent force to three—superintendent, ranger, and clerk—augmented during the summer season by two ranger naturalists.

CONSTRUCTION AND MAINTENANCE

Roads.—The old, narrow road connecting the three lakes—Jenny, String, and Leigh—has been widened and parts surfaced with sand, and roadside clean-up is well under way. Vistas have been cut so that views may be had of the lake and mountains.

Trails.—A good beginning has been made on what is to be known as the Skyline Trail which is to traverse the higher country connecting Leigh Canyon, to the north, and Death Canyon at the southern end of the park. The northern portion, beginning at Leigh Lake and skirting the west shore, has been completed well up into the canyon. Spurs to scenic points away from the main trail are being constructed and numerous small bridges have been erected over streams and springs. A trail to Surprise and Amphitheater Lakes, one-half mile below the glacier on the Grand Teton, is near completion, and this has proved to be a most popular all-day horseback trip. Trails have been completed to Taggart and Bradley Lakes, which in turn connect with the main Skyline Trail at Jenny Lake. In all, 8 miles of standard 4-foot trail and 12 miles of secondary trail have been completed since June 15, 1930.

Snowshoe cabins.—Two new standard snowshoe cabins were completed during the summer season, one well up on the west shore of Jackson Lake and the other on the north shore of Leigh Lake, both very important from the standpoint of winter protection of the park.

Buildings moved.—Two log buildings, originally belonging to the Snake River Land Corporation and turned over to the Park Service, were moved to points of most usefulness. The first, a 2-room building, was moved to the Jenny Lake camp ground, where it served as an information office and museum; the second, a 30 by 30 garage, was moved to headquarters to serve as a workshop and storehouse for heavy hardware and machinery.

Camp-ground improvements.—A water and sewer system was installed in the Jenny Lake camp ground and a standard comfort station constructed.

FISH PLANTING

In August, 1930, 140,000 native trout (fry) were planted in String and Leigh Lakes, having been furnished by the Yellowstone Park fish hatchery. During September 25,000 brook trout, furnished by the United States Bureau of Fisheries at Saratoga, Wyo., were planted in streams of the park.

ANIMALS

Moose.—Moose are even more plentiful this year than last. It was noted, however, during the early spring months, that apparently a disease of some nature had attacked the moose, for eight carcasses were found on the east side of the river. Specimens were sent to Washington, but no definite conclusion was reached. It is presumed that the moose in question died of hemorrhagic septicemia.

Bears.—Bears are very noticeably on the increase. While very few were seen last year, except on the remote mountain trails, they have even been so bold as to visit the trail camps.

Elk and deer.—Few elk frequent the park areas, except during spring and fall migrating periods. Deer are more plentiful and are often seen on the trails and in fields along the floor of the valley.

Beaver.—There is also a noticeable increase in beaver on the lakes and streams along the base of the range within the park boundaries.

ASCENT OF MOUNT OWEN

Mount Owen, whose topmost spire is 12,910 feet above sea level, had resisted for more than 40 years every effort of mountaineers to reach its summit. A granite knob at the summit had always proved insurmountable, for nearly 80 feet of almost perpendicular face make up the last portion of the climb.

Reaching this point about 11 a. m. on July 16, however, Dr. F. M. Fryxell and Phil D. Smith, ranger naturalists of the park; Robert Underhill, professor of philosophy at Harvard University; and Kenneth A. Henderson, of West Newton, Mass., succeeded in finding a rocky ledge which led to the west and upward to the topmost pinnacle of the towering peak. Later, on July 31, Paul Petzoldt, of Twin Falls, Idaho, also accomplished the feat. All of the men are experienced mountaineers. Underhill and Henderson have international reputations, and are members of the Alpine Club of London and the American Alpine Club.

MISCELLANEOUS

The Teton Transportation Co. operated a 14-passenger bus between Victor, Idaho, terminus of the Union Pacific system, and Moran, Wyo., through the park, connecting at Jackson, Wyo., with the Rock Springs bus line and at Moran with the Yellowstone Park and Yellowstone-Lander Transportation companies. Teton Lodge, at Moran, is under management of the Teton Investment Co., a holding company of the Snake River Land Corporation. Vast improvements were made including the addition of 80 cabins and the installation of water and sewer systems.

The Fox Film Co., with over 400 employees, spent six weeks in the valley filming "The Big Trail," the Fox film of the year.

Service to the public by the public-utility operators was vastly improved. The operators are: Harrison R. Crandall, photographic studio; Mr. and Mrs. Karl C. Kent, Jenny Lake Inn; Aubrey C. Lyon, horseback and pack trips; and Charles J. Wort, boating on Jenny Lake.

TRAVEL

There are no formal entrances to the park and therefore no accurate check of travel can be kept, except in the automobile camp grounds at Jenny and String Lakes. Our statistics, therefore, are taken from the Snake River or southern entrance to Yellowstone National Park. Last year it was estimated that 51,500 people visited the park during the year. Of this number 8,334 people in 2,474 automobiles used the public automobile camp ground. The total estimate this year is 60,000 people, including 8,216 in 2,145 automobiles who used the public camp grounds.

VISIT OF THE SENATE SPECIAL COMMITTEE ON WILD LIFE RESOURCES

On September 22, 1930, three members of the Senate Special Committee on Wild Life Resources, including Chairman F. C. Walcott and Senators Key Pittman and Peter Norbeck, arrived in the park to study wild-life conditions, proposed extension of the park lines, etc.

They were accompanied by their staff and by Paul G. Redington, Chief of the Biological Survey, Horace M. Albright, Director of the National Park Service, and C. Rachford, Assistant Forester of the United States Forest Service.

HAWAII NATIONAL PARK

THOMAS J. ALLEN, Jr., Superintendent, Hawaii National Park, Hawaii

GENERAL

The past year has seen a good start made toward proper development and improvement of Hawaii National Park in order to make its administration more efficient and its features of more complete access by the public. Development, already long delayed, should be continued at a reasonable rate.

ADMINISTRATION

The approved organization includes a superintendent, chief ranger, associate naturalist, foreman, clerk, three permanent rangers, and one temporary ranger. Lack of civil-service lists of eligibles has prevented filling the positions of naturalist and one ranger vacancy up to the time of this report. Active administration of the Haleakala area on the island of Maui is now possible by assignment of a permanent ranger there as soon as lists become available.

FEDERAL JURISDICTION

In April, 1930, the Congress passed a bill giving exclusive jurisdiction over the park area to the Federal Government and placing a United States commissioner here with judicial powers. This action cleared up the legal problem of whether Territorial or Federal courts should prosecute violations of regulations.

WEATHER

The dry summer and fall of 1929 were followed by a very heavy rainfall during the winter and spring months of 1929-30, and with continual rainfall through all months of the year excepting July and September. Many days of 3 to 6 inches of rainfall occurred, and during December and January trails and roads were very greatly damaged. Rainfall records for the year exceed the normal of 104 inches.

TRAVEL AND VISITORS

Even though total travel figures for 1930 do show a decrease when compared with 1929, normal park travel has shown a healthy growth. The drop in our total figure is due to the failure of any spectacular flow of molten lava during the year to attract sudden and enormous periodic crowds of local visitors. Visitors have come from a majority of the nations of the world, as our geographical position places us on the route of world travelers. Seven around-the-world steamers, several Japanese naval training vessels, groups from the chambers of commerce of Los Angeles and San Francisco and from the Sierra Club of California were among our special visitors.

Comparative travel, 1929-30

	1929		1930	
	Cars	Persons	Cars	Persons
General.....	15,415	92,483	24,906	75,510
Kilauea Military Camp.....	68	3,072	309	3,343
Hotel and summer camp.....	2,864	14,302	3,036	10,725
Grand total.....	18,347	109,857	28,251	89,578

Revenues

	1928-29	1929-30
Cottage site rentals.....	\$450	\$450
Grazing permits.....	25	25
Hotel lease.....	1,000	1,000
Photographer's permits.....		25
Grand total.....	1,475	1,500

Appropriations

	1929-30	1930-31
Roads and trails in national parks.....	\$6,500	\$166,000
Administration and protection and maintenance.....	27,400	36,500

Air transportation between the islands of the Territory of Hawaii was inaugurated November 11, 1929, by the Inter-Island Airways (Ltd.), a subsidiary of the Inter-Island Steam Navigation Co. Service between Honolulu and the island of Hawaii started on a 2-trip per week schedule, but almost at once increased to a daily round-trip service, which is now in operation.

The burning and destruction of the steamer *City of Honolulu* during May has affected travel to the park, as this vessel was one of the most popular for the trip between Honolulu and here.

VOLCANIC ACTION

Although fully expected and with all signs indicating it, no flow of molten lava has occurred in the past year from either of the volcanoes Kilauea or Mauna Loa. The last flow was July, 1929. However, expectations of eruption were justified during four weeks of September and October, 1929, when the entire island of Hawaii was continually shaken by over 3,000 earthquakes caused by movement of lava under pressure within the earth. The epicenter of these shocks was under Mount Hualalai, at the northwest corner of the island. Some jolts were of sufficient strength to shake all other islands in the Territory. Stone walls were thrown down, unstable foundations of small buildings were moved, water tanks were turned over, and other moderate damage occurred near the quake center. It is supposed that the lava, by finding passage upward in the core of Mauna Loa, relieved its tremendous pressure before it forced a way to the surface. Since then pressure has again been accumulating, and by measurement of ground tilt and other indications there once more appears possibility of volcanic action in the near future. The rim of Halemaumau fire pit is daily showing new and wider cracks and large sections have collapsed into the pit, carrying hundreds of tons of earth and rock.

MAINTENANCE AND CONSTRUCTION

Heavy rains, often precipitating several inches within 24 hours, caused maintenance work far in excess of the funds originally allotted for such work on park roads and trails. All repairs were made as they occurred, and funds needed were transferred from other accounts. Twenty-five miles of road and 90 miles of trail were kept in condition and in use during a 12-month season, and the large parking area at Halemaumau was improved.

Park buildings were painted and repaired as requirements arose. Two employees' cottages were lined with plaster board for warmth and protection from dampness, hot-water systems were installed in two houses, and chimneys and stoves were installed for winter comfort in four houses.

All park equipment was maintained in a satisfactory condition.

New trail construction has included reconstruction of the Bird Park Trail into a useful automobile trail or secondary road, construction of a trail into Kilauea Iki Crater, a 12-mile trail from the 10,000-foot elevation to the summit of Mauna Loa, a trail along the northwest rim of Kilauea passing over the steaming bluff region, reconstruction after storms of the Waldron Ledge Trail, and the Halemaumau Trail into Haleakala. This last trail has been wiped out two years in succession and will be relocated this next spring.

Funds amounting to \$161,000 have been allotted for widening and surfacing all main park roads and surveys for the work have been completed by the United States Bureau of Public Roads, which bureau is now drawing up specifications to be used in a request for bids on the construction.

New buildings erected include a warehouse of frame construction with concrete floor and platform, public toilets of masonry and galvanized iron at Uwekahuna, public toilets of the same type at Halemaumau, and a lava stone shelter at Hilina Pali overlooking our seacoast. The shelter is a structure donated by the Hui O Pele committee of the Honolulu Ad Club. This organization is also receiving estimates on construction of a lecture hall, seating 170 persons, which they will erect at Uwekahuna Bluff and donate to our educational uses. The plans have already been approved by the director.

Twenty-five miles of metallic-circuit telephone line have been erected within the park as a basis of a park communication system. This is the first telephone construction to be completed in Hawaii National Park.

ANIMAL PESTS

Three thousand wild goats and 50 wild pigs of domestic origin were killed as part of a program to exterminate these animals from the park and from the island. There are still several thousand more goats and hundreds of pigs which seriously interfere with growth of natural verdure and which should be eliminated. The Territorial forestry department cooperates in this work by supplying us with rifles and ammunition and now and then staging a drive by horsemen. Shooting is always restricted to park personnel or responsible persons with park men.

One hundred and twenty-nine mongooses were trapped in order to prevent destruction of eggs and young of ground-nesting birds. Mongooses are plentiful

but at present can be controlled only in our most populated bird centers due to their annual entrance from outside areas not protected.

EDUCATIONAL SERVICE

Although unable as yet to secure a properly qualified naturalist, park rangers and the superintendent have carried on an educational program of lectures and hikes which are already so popular that the Uwekahuna Observatory has become too small for our audiences. Within the near future a list of civil-service eligibles should furnish a naturalist to carry on this work and make it more complete. We are now in need of educational films on volcanology and slides on botany and other subjects.

PUBLIC UTILITY OPERATORS

The Kilauea Volcano House Co. continued to operate Volcano House as a hotel accommodation and also Kilauea summer camp. Many complaints have been received from guests regarding lack of heat, hot water, baths, and regarding other services as well as regarding the rates charged for service rendered. Reports have been made to the director by the superintendent that conditions should be improved, and the matter has been taken up with officers of the company, who seem to be disinclined to take any action toward betterments.

K. Maehara, of Hilo, has under a yearly photographer permit erected a studio and residence for the purpose of supplying visitors with photographs and photo supplies. The studio has just been opened for business.

KILAUEA MILITARY CAMP

The recreation divisions of the Hawaiian Department, United States Army, and of Pearl Harbor, United States Navy, continued to operate a leave area at Kilauea Military Camp upon a subleased section of park lands. The Army portion of this area is the largest by far, and during the past year has been bettered and enlarged. Operation of an Army boat on a twice-per-week schedule between here and Honolulu has kept the camp with a visiting list of never less than 200 enlisted men and 5 to 30 officers and their wives. Capt. K. W. Thom continued in command and has shown excellent cooperation in enforcement of park regulations among his men. His staff consists of 3 officers, 1 a medical captain, and 55 men.

UNITED STATES GEOLOGICAL SURVEY

The United States Geological Survey continues to operate its Volcano Observatory under Dr. T. A. Jaggar. Doctor Jaggar and his assistants do continual research work on questions of volcanology and volcanic action. Their cooperation with park forces has been of great assistance to us and of the finest.

PRIVATE LANDS

The lands, including the Thurston Lava Tube, a principal park feature, still remain in private ownership due to delays in land exchanges between the owners and the Territorial land commissioner. There is no restriction on park use of these lands, however, and the deals are being gradually consummated.

RECOMMENDATIONS

Hawaii National Park is behind other parks in development. It has now received a fine start, which should be carried out rapidly along all lines of activity. The park is badly in need of adequate administration offices and of a proper ranger force to protect visitors during periods of eruption.

Major action must be taken toward improvement of public hotel facilities.

In educational work this park has possibilities second to no other. It would be well if some representative of the secretary's educational committee could make a study of our natural features and their relation to public information.

Visits by the director and members of his staff at more frequent intervals would be of great value in furthering development and understanding of local problems. Past visits have proven so and it is recommended that they be permitted oftener.

HOT SPRINGS NATIONAL PARK

Senior Surgeon HUGH DEVALIN, United States Public Health Service, Superintendent
Hot Springs, Ark.

GENERAL STATEMENT

The total receipts of the pay bathhouses for 1930 were \$556,987.47, as compared with \$570,486.14 for the fiscal year 1929. The net profits reported for the 19 pay bathhouses aggregated \$186,971.69. Two pay bathhouses reported deficits amounting to \$3,308.06. Total profits, including deficits for this fiscal year, amounted to \$183,663.63, as against \$197,161.34 for last year.

The baths given were as follows: Complimentary, 1,370; paid, 637,853; at the United States free bathhouse, 107,296; at the Leo N. Levi Memorial Hospital bathhouse, 12,359; making a grand total of 758,878 baths, as compared with the grand total of 773,628 baths given during the previous year.

THE SPRINGS

The springs, 46 in number, are located on the Central Avenue slope of Hot Springs, Mountain. The estimated daily flow is 850,000 gallons of hot water with an average temperature of 142° F. Water is collected and distributed to the United States free bathhouse, Leo N. Levi Memorial Hospital bathhouse, and 19 pay bathhouses, all of which are under Government supervision. The Army and Navy General Hospital receives hot water from the same general source through its own system of wells and tanks.

ADMINISTRATION

The park is in charge of the superintendent, who has supervision over all matters pertaining to the park and its management and to the general sanitation and control of all bathhouses receiving hot water, as well as control over all employees connected with the bathhouses.

The park personnel is divided into the following departments: Administrative, police, maintenance, and free bathhouse and clinic.

RECEIPTS AND EXPENDITURES

Receipts:

Water rent	\$41, 353. 33
Ground rent.....	200. 00
Privilege fees—	
Registered physicians' continuance fee.....	\$3, 940. 00
Physicians' examination fee.....	50. 00
Physicians' registration fee.....	45. 00
Bath attendants' certification fee.....	1, 699. 00
Masseurs' certification fee.....	588. 00
	<hr/>
	6, 322. 00
Miscellaneous—	
Sale of attendants' badges.....	5 25
Sale of unserviceable property.....	50. 75
	<hr/>
	53. 00

Total deposited to credit of miscellaneous receipts..... 47, 931. 33

The unexpended balance of the special fund available for the improvement of the park from the sale of lots is \$1,020.65, the unallotted funds being \$58.82

The following expenditures were made by the park from its appropriation

For administration, protection, and maintenance..... \$67, 645. 95

CONSTRUCTION, MAINTENANCE, AND REPAIRS

Superintendent's residence.—The general maintenance work was conducted for the upkeep of the grounds about the house. New drains and sprinkling system were installed about the grounds where necessary. Fireplaces in several rooms were changed from gas-burning to wood-burning type. Sleeping porch was constructed over front porch. Interior was painted and floors repaired. Gas-burning unit was installed in furnace, changing heating plant from coal to gas-burning type.

Fountain street residence.—Heating plant was renovated and changed from coal to gas-burning type. Minor repairs were made to windows and porches. Old partitions in basement were removed.

Free bathhouse and clinic.—New baffle-board system was installed in cooling tanks, as old construction had deteriorated to a point where it was inefficient. The building was painted both inside and out. New steel window frames and sash were installed. Repairs were made to water and power lines. Lawns placed in good order; new shrubbery planted. New concrete light poles were installed around the walks on three sides of the building.

Nursery building.—On account of heavy snow in January, 1930, it was necessary to brace the roof of this building from the inside, as there was danger of its caving in.

Comfort stations.—Minor repairs were made to the various comfort stations in the park. New wall was constructed between the male and female dressing rooms in the camp grounds.

Shelter houses.—Minor repairs were made to all shelter houses in Hot Springs National Park.

Whittington Park.—Public tennis court was regraveled and fountains repaired. Minor repairs were made to the Whittington Park residence, pavilions, and tennis court stands. One pavilion was removed on account of its dangerous condition.

Grounds.—There was a light infestation of caterpillars which attacked principally the fruit-bearing and hardwood trees. It is believed that this pest has at this time been successfully combated. All lawns were regrassed and put in good shape for the seasons; trees needing trimming and pruning received necessary attention. Four thousand tulip bulbs were planted at various points. New shrubbery propagated and grown in the park nursery was set out in various sections of the park. Continued planting of young trees in the interest of reforestation was carried out throughout the year at various advantageous points. All dead and down timber on the mountain slopes has been cut and removed. An 8-inch curb was constructed around the grass plots along Magnolia Row, grass sown, and shrubbery planted, greatly improving the appearance of the row.

Roads.—The usual amount of maintenance and repair work, such as grading, cleaning of ditches, widening and repairing turns, graveling, etc., was conducted during the year. Several dangerous turns on the West Mountain Road have been eliminated by building walls and filling in. Contract was awarded to W. O. Creason in the spring of 1930 for the oiling of all park roads. This was practically completed at close of fiscal year, thus doing away with the dust nuisance. Contract for paving of certain areas on Reserve Avenue abutting on park property and on Spring and Laurel Streets bordering Government free bathhouse was awarded to Ed. B. Mooney. This job was practically completed at the close of the fiscal year, and in addition to abating the dust nuisance it has enhanced the appearance of the locality.

Trails.—Maintenance work on the trails, such as clearing weeds, graveling, repairing drains and water breaks, was carried on. Steps and walks on the steeper trails were repaired where needed. Metal trail signs which had been damaged by vandals were repaired and replaced where necessary.

Electric-lighting system.—Repairs were made to the electric system along bathhouse row and at other points throughout the park area. Electric-light poles of concrete were used as replacement for old iron standard poles. These poles are cast by the park personnel and can be made and installed at a smaller cost than the iron poles and are better suited from a landscape viewpoint.

Water system.—Fountains at various points in the park were repaired and kept in order. Drinking fountains installed on the trails and roads of Hot Springs Mountain were repaired where necessary. The chief civil engineer had an associate in the park during the spring accumulating data to be used in the construction of a comprehensive hot-water storage tank and distributing system, funds for which are available in the fiscal year 1931.

Heating system.—All heating plants in park buildings were inspected, overhauled, and repaired where found necessary.

Machinery and equipment.—All machinery and equipment were given the necessary overhauling and repairs. Automotive equipment was built up a number of times, and all trucks, graders, etc., were kept in good operating condition. A new tractor was obtained and the old one condemned and sold.

Public camp grounds.—The drains about the grounds were repaired where necessary and timber removed from the camp area. All fences and barriers

were kept in good state of repair. Ditches were cleaned, weeds cut, and the roads graded and oiled. Minor repairs were made to the various buildings in the camp. The concession formerly granted for the sale of groceries, soft drinks, etc., was discontinued as being no longer needed.

Miscellaneous.—Park benches were repaired and painted. All bandstands, approaches, and parapets were kept in a good state of repair. Flower beds and borders were planted at advantageous points. Shade trees were planted where others had died or been broken by storms. All equipment in the park available for the comfort of visitors was kept in good repair. The creek running through Whittington Park was cleaned out when necessary.

UNITED STATES FREE BATHHOUSE

The average number of persons bathing daily at the Government free bathhouse was 343, with a total of 107,296, as compared with an average of 337 daily and a total of 102,882 last year. The total number of persons bathing was 7,008, as compared with 6,750 last year.

The total number of patients examined and treated in the free clinic was 5,704, as compared with 5,265 last year. Of this number, 4,441 were venereal-disease cases. The nonvenereal cases were treated at the Leo N. Levi Memorial Hospital. The total number of examinations, treatments, analyses, etc., given at the clinic during the year was 130,752. Of this number, 361 examinations were for the city board of health.

The course of instruction for physicians was continued at the clinic, 16 physicians taking the course.

PAY BATHHOUSES

The following table shows the hot-water and ground leases in effect during the fiscal year 1930:

Hot water and ground leases

Name of bathhouse	Lessee	Tubs	Date of lease	Expiration
Alhambra	Alhambra Bath House Co.	18	Mar. 1, 1928	Feb. 28, 1933
Arlington ¹	Arlington Hotel Co.	90	Jan. 1, 1925	Dec. 31, 1944
Buckstaff	Buckstaff Bath House Co.	30	Jan. 1, 1912	Dec. 31, 1931
Fordyce	S. W. Fordyce, jr., trustee	30	Jan. 1, 1915	Dec. 31, 1934
Hale	Union Trust Co., trustee	25	do	Do.
Imperial	Charles N. Rix	24	Jan. 1, 1912	Dec. 31, 1931
Kingsway ¹	New York Hotel Co.	89	May 13, 1912	May 12, 1932
Lamar	Lamar Bath House Co.	26	Jan. 1, 1926	Dec. 31, 1945
Levi Memorial	Leo N. Levi Memorial Association	5	Nov. 1, 1924	Oct. 31, 1934
Majestic ¹	Majestic Hotel Co. (Inc.)	23	Jan. 1, 1913	Dec. 31, 1932
Maurice	Maurice Bath House Co.	30	Jan. 1, 1912	Dec. 31, 1931
Moody	New Moody Hotel Co.	16	July 1, 1930	June 30, 1950
Ozark	Ozark Bath House Co.	26	July 1, 1922	June 30, 1942
Ozark Sanatorium	Ozark Sanatorium Co.	10	Sept. 17, 1922	Sept. 16, 1932
Pythian (colored)	Pythian Bath House & Sanatorium Comm.	16	Dec. 16, 1924	Dec. 15, 1944
Quapaw	Quapaw Bath House Co.	40	Feb. 1, 1922	Jan. 31, 1942
Rockafellow	Mahala J. Rockafellow	18	July 1, 1930	June 30, 1950
St. Joseph's Infirmary	Sister Superior	12	Feb. 1, 1924	Jan. 31, 1934
Superior	Superior Bath House Co.	20	Feb. 15, 1916	Feb. 14, 1936
Woodmen of Union (colored)	Supreme Lodge, Woodmen of the Union	11	Mar. 1, 1922	Feb. 28, 1942
Arlington Hotel, grounds.	Arlington Hotel Co.		Mar. 21, 1914	Mar. 6, 1932
Hot Springs Mountain Observatory, grounds.	Hot Springs Mountain Observatory Co.		Jan. 1, 1926	Dec. 31, 1935

¹ Water used in private rooms in portion of tubs leased.

SANITATION AND PUBLIC HEALTH MATTERS

Regular inspections were made of the male and female departments of all bathhouses. During the heavy winter bathing from two to three inspections were made each week; during the rest of the year inspections were made weekly.

Bacteriological examinations of the water supplied the bathhouses have been made regularly, and where contamination was found necessary steps to remedy the condition were taken.

On the first of each month all bathhouse employees coming in personal contact with bathers were given physical examinations. New employees were

given complete physical examinations, including the Wassermann test before being permitted to work in bathhouses.

Mosquito-control work was conducted wherever breeding places were found. Particular care has been taken to keep the public camp grounds free from mosquitoes.

To increase the efficiency of bathhouse personnel and provide more attendants, a school of instruction was held for one month. Lectures were given at intervals to bathhouse employees relative to their work. Examinations have been held at irregular intervals for applicants for the position of masseur or masseuse in the bathhouses. These examinations are written, oral, and practical.

The park authorities assisted the city of Hot Springs in physical examinations, typhoid and smallpox vaccinations, and Wassermann tests of all persons engaged in handling foodstuffs in the city. Cooperation was given in the examination of various specimens submitted to the laboratory and also on the question of rural sanitation.

There were five physicians added to the registered list during this year.

VISITORS

It is estimated that about 167,062 persons entered the park last year; 81,820 people came by automobile, 56,928 by train, and 28,314 by stage, etc. The number of people using the Government free auto camp at the Gorge was 3,860, who came in 1,248 cars.

LASSEN VOLCANIC NATIONAL PARK

L. W. COLLINS, Superintendent, Mineral, Calif.

Another year saw great strides forward in the development of Lassen Volcanic National Park, with increased activity in all departments. The outstanding events can be summarized as follows: An increase in travel was recorded; the first checking stations were erected; additional buildings at headquarters were constructed; a park-operated lookout station was installed; the telephone system was extended; the Park Loop Highway was completed in regard to grading; and a new standard trail was constructed to the top of Lassen Peak.

As a result of the additions of the year, we now have 29.77 miles of roadway constructed under modern methods and specifications, $2\frac{1}{4}$ miles of good dirt road, and $7\frac{1}{4}$ miles of fair, passable road. Supplementing these roads there are approximately 12 miles of trail graded by park forces, 20 miles of trail graded by private operators, and some 60 miles of old trails which were in the park at the time of its creation. With the new extensions of the phone lines, our total mileage is now 54. Of the latter figure, 4 miles are a metallic system and the remaining grounded line.

WEATHER

September started what promised to be the mildest winter in Lassen's history as a national park. There was no snowfall during that month. The fair climatic conditions continued through October and November, the latter being the driest November since 1890. December was the opposite of all our expectations and was branded as a gentle winter month. We were able to drive into the park after Christmas for the first time in at least eight years.

Heavy snows fell during January, February, and March, and due to the lateness of the winter the snow remained on the ground 10 days later than usual. This lessened the fire hazard for the year to some extent.

ADMINISTRATION

The entire permanent personnel consists of three men—the superintendent, a clerk-typist-bookkeeper, and one permanent ranger.

Appropriations.—Appropriations made available since the date of the last report are:

General park appropriation.....	\$29,040.00
Forest protection and fire protection.....	4,305.00
Purchase of lands, national parks.....	2,000.00
Roads and trails.....	205,116.59
Total.....	240,461.59

PROTECTION

With but one permanent ranger and three temporary rangers, one of whom is stationed at the museum at Manzanita Lake until the time when a park naturalist is secured, our ranger force is entirely inadequate to afford the protection which is necessary for the best interests of the park. While these men patrol the entire area, the intervals between such patrols is too long for effective control. Next season, with the Loop Highway and the consequent increase in travel that is expected, a larger ranger force will be necessary in Lassen.

Fish planting.—Again the State of California furnished trout fry for the streams and lakes within the park. Some 517,000 trout fry were secured from this source and planted by rangers.

Patrolling.—Each ranger, with the exception of the temporary at Manzanita Lake, was given a definite region to patrol, in order to furnish information to visitors, police camp grounds and the area in general, and to protect the natural features of the park. However, as stated above, the ranger districts are too large for effective work to be carried on therein by one man.

Guide service.—In addition to their other duties the rangers served in the capacity of guides to various parties and organizations which selected Lassen as their picnic and vacation grounds.

TRAVEL

A great increase in the amount of travel to Lassen Volcanic National Park was recorded during the year. The new road from the southwest was the main avenue for visitors who sought recreation here, inasmuch as this road leads directly to the base of the mountain where the ascent on foot was easiest. The majority of this travel underwent hardships because the greater part of this route was under construction, a surfacer being busily engaged placing crushed rock on the roadbed.

However, the Park Loop Highway will be open in a short period, and travel to other parts of the park will naturally become heavier. Park visitors totaled 31,755 this year as compared with 26,106 for 1929, an increase. There were 9,896 private automobiles.

Total season travel, by entrances, 1930 and 1929

Entrances	By automobile		Miscellane- ous	Total visitors
	Cars	Visitors		
1930				
Warner Valley.....	2,350	7,278	5	7,283
Juniper Lake.....	713	2,118	-----	2,118
Sulphur Works.....	2,990	10,485	9	10,494
Manzanita Lake.....	1,636	4,628	5	4,633
Lost Creek.....	1,581	4,839	-----	4,839
Butte Lake.....	626	2,388	-----	2,388
Total.....	9,896	31,736	19	31,755
1929				
Warner Valley.....	3,332	9,176	-----	9,176
Juniper Lake.....	694	1,975	-----	1,975
Sulphur Works.....	1,098	3,703	18	3,721
Manzanita Lake.....	1,247	4,153	-----	4,153
Lost Creek.....	1,339	4,511	19	4,530
Butte Lake.....	660	2,528	18	2,546
Total.....	8,370	26,051	55	26,106

CONSTRUCTION

Roads.—Construction of the original Loop Highway, encircling Lassen Peak, will be completed in regard to grading within a few days. An 8-mile addition to the Loop Highway, caused by boundary extensions, will also be completed during the present season. When these two jobs are finished a 29-mile through-park road will be available.

A contractor is applying a rock surface to the remaining bit of unsurfaced road on the original project, while the additional 8 miles added to the Loop will be surfaced next season.

Trails.—The major trail to be constructed this year was that to the top of Lassen Peak. It is $2\frac{1}{2}$ miles in length and is constructed on a 15 per cent maximum grade. The old trail to the top, although subjected to heavy travel, was too difficult for the inexperienced hiker.

Telephone lines.—Two new branch lines were constructed by park forces during the year. The first, 7 miles in length, put the Manzanita Lake ranger station and the museum on the park lines for the first time. Previously communication was established with this point through the courtesy of the Forest Service granting permission to use their lines.

The second line, 6 miles long, connected the newly constructed Harkness lookout station with headquarters.

Buildings.—Inclement weather conditions prevented the completion of an employee's cottage at headquarters last year and this was the first bit of work on the 1930 program. After that the crew of builders was moved to Mount Harkness, where the new park lookout station was erected. The next building was constructed at the Sulphur Works entrance, where the first checking station was built. Another checking station at Manzanita Lake entrance will be erected provided climatic conditions permit.

MAINTENANCE

Roads.—The strange winter subjected the Loop Road to abnormal conditions. On the north side the first major damage was committed at Hat Creek, where the wood bridge was washed away. It was some time before actual work could be started, due to a series of unavoidable delays. However, a concrete box culvert was installed due to lack of any real foundation in this particular zone.

Other than that the road on the north side was in fair shape, although a considerable amount of blading was necessary and gutter lines necessitated cleaning.

The southwest sector of the Loop suffered far more severely. Several large slides had to be removed and a gasoline shovel was kept busy part of the season removing debris which had come into the road. The entire lateral had to be bladed.

Trails.—Several of the trails were cleaned of debris during the present season. However, the majority of those constructed with park funds were found to be in a good state of repair this spring.

FIRE PREVENTION

Lookouts.—The first park-operated lookout station was established this year on Mount Harkness. This addition has proved to be very effective in fire-control work, inasmuch as the station is located at a strategic point for viewing the park area.

Fires.—Seven small fires have been reported to date in the park. Five of these were caused by lightning, one by a camper and the other through unknown causes. Of these, six were extinguished by the ranger force and the other necessitated additional help from park construction forces.

NATURAL FEATURES OF THE PARK

FISH AND GAME

Fish.—Trout were plentiful in the streams and lakes of the park this year and limit catches were reported in several instances. The State of California cooperated with us again by providing 517,000 trout fry for planting in park waters.

Deer.—More and more deer are being seen within the boundaries. This year the deer were especially abundant in the entire region and during the hunting season they sought the haven which the park provides. It is no longer an unusual sight for a visitor in this park to see deer feeding in one of the meadows or alongside the road. This is indeed a contrast with the past when all one saw was a fleeting glimpse of a patch of buckskin scurrying for shelter.

Bears.—More bears were reported seen during the present season than ever before. They are still timid and only seen when caught unawares.

Other animals.—Porcupines, pine martens, woodchucks, badgers, one or two mountain lions, and several smaller animals inhabit the area, although no official count has been taken.

Birds.—Grouse and quail continue to make the park a breeding ground and a number of smaller birds are also found within the boundaries.

THERMAL PHENOMENA

Lassen Peak.—Steam continues to emit from the crater of 1914-15, but that is the only apparent indication of any life in Lassen itself.

Bumpas Hell.—The fumaroles, geysers, and mud pots in this area have lost none of their heat or violence. Bumpas Hell has become a central point of interest for visitors, being next in importance to Lassen Peak and the Cinder Cone.

Sulphur Works.—Inasmuch as the road passes through this area of fumaroles, small gysers, and mud pots, the Sulphur Works always incites the curiosity of the traveler. While lacking the violence of Bumpas Hell, it will always be a point of interest. Deposits of sulphur (from which the region derives its name) are found throughout and the yellow of this element mingles with the shading caused by the other minerals in the region to give a fantastic coloring.

Devils Kitchen.—The Devils Kitchen, with the Boiling Lake, forms a third region of geysers, fumaroles, and mud pots. These are another point of interest, especially for tourists entering from the southeast.

MISCELLANEOUS

Cooperative Federal and State activities.—The Bureau of Public Roads, Department of Agriculture, again under the interbureau agreement, has been supervising the road construction work in Lassen. The local representatives of the Bureau of Volcanology have continued to render valuable information and data regarding the geology of the park. The State of California, through the Fish and Game Commission, furnished us with over 500,000 trout fry to plant in the park. Through their generosity, we are able to maintain the fishing standard in the park.

United States commissioner.—Seventeen cases were tried before the commissioner during the past year. These included breaking into private cabins, illegal pasturing of stock, and other infractions of the rules and regulations.

Purchase of private lands.—A land deal was consummated during August with Mrs. Emma Krickava, of Cottonwood, Calif., for 80 acres of land within the park. This was a valuable acquisition, inasmuch as the extensions to the Loop Road were routed directly across this property.

MESA VERDE NATIONAL PARK

JESSE L. NUSBAUM, Archeologist-Superintendent, Mesa Verde National Park, Colo.

GENERAL STATEMENT

In the early days of discovery and exploration, and during its first years as a national park, Mesa Verde was only accessible by tortuous Indian and pioneer trails, first through the Mancos Canyon, and later over the great north escarpment from both the Mancos and Montezuma Valley approaches. The trail trip, requiring from one to two days, was an arduous one, potable water was scarce, and the friendship of the Southern Ute Indians was always an uncertainty. Twenty-two years elapsed following the first published report of the discovery of cliff ruins in the Mancos Canyon before Congress, by the act of 1906, created the Mesa Verde National Park, and thus insured the permanent preservation and protection of the most notable and best preserved cliff dwellings in the known world, in addition to the thousands of lesser archeological remains included within the present park boundaries.

Present day visitors to Mesa Verde no longer suffer the discomforts and hardships of the early years. The park has 40 miles of unsurfaced but excellently maintained highways, 50 miles of improved pioneer and Indian trails, and 24 miles of telephone line. With the exception of the foregoing improvements, one road maintenance camp, and one ranger patrol station, all developments within the park area have centered around Spruce Tree Camp, park head-

quarters, where housing and other facilities to care for all park visitors and park personnel are available.

The present park hotel has accommodations of the cabin and tent type for about 200 guests, and the free public camp ground maintained by the Park Service can care for 350 visitors.

Because of the heavy cloud-bursts and abnormal precipitation during July and the first two weeks of August, the water supply for the past season has been sufficient to care for all reasonable requirements.

On January 4, the Secretary of the Interior approved a year's leave of absence for Superintendent Nusbaum, placing him on a W. A. E. status, so that he might assume the acting directorship of the Laboratory of Anthropology to which he had been unanimously elected, and still devote at least a fourth of his time to his work with the National Park Service and the department. Under the new appointment, headquarters were established both at Santa Fe, N. Mex., and at the park. Chief Ranger Finnian was designated acting superintendent in the absence of Mr. Nusbaum, and has handled the work at the park in a most creditable manner.

Seven employees constitute the present field organization: An archeologist-superintendent, chief clerk-special disbursing agent, assistant clerk-stenographer, park naturalist, chief ranger, permanent ranger, and park mechanic. During the open travel season this force is augmented by the addition of 15 temporary employees consisting principally of ranger guides to care for visitors and the other open season activities. All temporary rangers form a part of the educational division of the park, and through these men the service is brought in direct contact with the visiting public, since, under the present procedure, all the visitors to the ruins must be accompanied by ranger guides. Except for skilled help, such as gradersmen, carpenters, etc., Navajo Indians from the adjacent reservation form more than 90 per cent of the labor forces. They are excellent workmen and their employment has been to the mutual benefit of the Government and themselves. During the winter the permanent force is occupied with general betterment work; archeological investigations and excavations; important museum work consisting of the preparation and installation of exhibits; small construction projects; the manufacture of equipment, particularly furniture for public buildings, which is designed by the superintendent and made in the carpenter shop at park headquarters; the overhauling and repair of all automotive equipment; snow removal and maintenance of the main park highway, and the regular office routine and administrative duties.

Joseph H. Jackson, of Mancos, Colo., was appointed resident United States commissioner to fill the vacancy created by the resignation of James M. Dalton.

New road construction constituted the most outstanding improvement of the year. In the fall of 1929 two important sections of the north entrance highway were completed. During dry weather this road exacted much favorable comment from visitors, but during the heavy rains of July and August the resultant mud conditions emphasized the immediate need of gravel surfacing. Excellent results have been obtained by the Indian labor on force account work on the realignment and improvement of about 4 miles of the interconnecting ruin road system. These new roads are being built to a width of 20 feet, with easy curves and grades, and will be of a standard suitable for graveling at some later date.

Two new residences at park headquarters now nearing completion will greatly help the problem of housing permanent employees. Specifications and bids were completed by the engineering office for the deep test water well and construction on this important project is under way.

The sum of \$6,000 was allotted this park for the improvement and reconstruction of approximately 4 miles of trail from camp headquarters to Spring House Ruin. By September 1, 1½ miles had been completed. The important force account work of widening and improving the Knife Edge section of road was completed by July 1. During the spring and early summer the county constructed a new approach road from the main State highway to the park boundary. This road was surveyed by the Bureau of Public Roads; conforms to their standards; is gravel surfaced, and a little over 1 mile in length. The improvement program of the telephone line, which has been carried through three fiscal years, was completed.

It is our good fortune to report that no fires of any description occurred within the park boundary during the year. However, considerable damage was caused the tree growth in certain areas on Chapin Mesa by the activities of

the pine beetle. Control work under the recommendations of the Bureau of Entomology was carried on in the early spring and excellent results were obtained.

Extremely heavy rains during July and August resulted in the greatest precipitation ever recorded in this park for the corresponding period of time. Roads were washed out on two occasions and extensive maintenance was necessary. Naturally travel was somewhat affected, but because of the excellent record established before the rains started and the rapid recovery in travel at the conclusion of the cloud-bursts, records will show a substantial gain in attendance over the season of 1929.

Most gratifying of all has been the appreciation of the scenic qualities of the park emphasized by the completion of the new highways over the great north face of the mesa. Great expanses of valley and some of the loftiest ranges in the Rockies are now seen nearly continuously from the main park highway. Director Albright, during a recent visit, was deeply impressed with the floral display.

New public-utility operators took over the hotel concession in May of this year. The company is known as the Mesa Verde Park Co. and is a subsidiary of the Denver & Rio Grande Western Railway. The stage line operating from Mancos to the park was also taken over by this organization and improved rail and stage facilities are now offered the public. The service has granted approval to shorten the park season from October 31 to October 15.

WEATHER

For six weeks in July and August, weather at the park and in the adjacent territory was not favorable to automobile travel. During the month of July 4.80 inches of rain was recorded, a record for this park. The first two weeks of August, which normally bring us our heaviest travel, were merely a continuation of July. The winter snowfall was the lightest ever recorded; but one heavy snow storm occurred and that came during the latter part of January, when a total of 19 inches of snow was measured at headquarters. The total precipitation for the year beginning September 1 and ending August 31 has been 16.28 inches, about 1 inch below normal.

TRAVEL

From the travel standpoint the past season has been most satisfactory. The percentage of increase will fall somewhat short of the mean annual gain for the past 8-year period, but this was to be expected with prevailing unfavorable weather and general conditions. During July important approach roads to the south of the park were washed out and travel was blocked for a period of several days at a time. The results of these washouts, so far as travel is concerned, are but momentary, but all tourists suffering from the inconvenience continue to tell the story for many weeks thereafter, which exerts a most damaging effect on later travel. This was particularly true during the year of 1929. Wolf Creek Pass, one of the main arteries of travel from Denver and the northeast to Mesa Verde, has been closed because of new construction for the greater portion of the year.

Of paramount importance is the fact that Mesa Verde is fast becoming a place of national and international interest. This is due in part to the dissemination of the story of its prehistoric inhabitants among our schools both at home and abroad. No longer is the park of merely local interest or character, nor do we now depend on the inhabitants of adjacent communities to furnish the majority of visitors. To exemplify this, in 1922, of the 3,378 persons entering the park, 2,350 registered from Colorado, and most of these from the local or near-by towns. Each year the number of visitors from Colorado has decreased and other States are gaining predominance, notably California, New York, and Pennsylvania. During the past year all 48 States, the District of Columbia, Alaska, and Hawaii have been represented, as well as 17 foreign countries. Of equal importance is the fact that never before have so many scientific and internationally famous professional people visited the area, some coming for inspection of park educational activities, some to study within the area, others to discuss field and other technical problems, while some are merely vacation bound. The ranger service, in addition to regular duties, conducts all visitors to and through the

ruins in groups of 25 to 35 people, thus combining the opportunity of performing educational service with the regular protective duties. The service rendered by the ranger force has been especially commended by many visitors during the past season.

Travel statistics for period October 1, 1929, to September 30, 1930

	1930	1929	Gain or loss	
			Number	Per cent
Visitors via:				
Private cars.....	15, 079	13, 336	1, 743	13
Private cars (second trip).....	1, 302	623	679	119
Rail.....	147	147	147	—
Commercial cars.....	54	188	—134	—67
Miscellaneous.....	74	370	—296	—80
Total.....	16, 656	14, 517	2, 139	14. 2

Total number of visitors using public camp grounds, 10,504.

Total number of visitors using hotels, 5,012.

PUBLIC UTILITY OPERATIONS

On December 31, 1929, the contract of Mrs. Oddie L. Carr, public utility operator, Mesa Verde National Park, terminated. The hotel, its equipment and supplies, was purchased by the Mesa Verde Park Co., a subsidiary of the Denver & Rio Grande Western Railway. No physical improvements were constructed by the new operator during the past season, so for this reason there has been no betterment as to housing facilities, sanitation system, and similar services. However, the dining service has been somewhat improved and to meet this, a small increase in rates was granted by the Secretary of the Interior. There is still an insistent demand by our visitors for a modern hotel conforming in architecture to the now extended park headquarters buildings of permanent construction. It has been tentatively agreed upon by the service and the present public utility operator to build a hotel of this character when water has been gained in sufficient quantities to permit the program and to insure guests of all modern conveniences. If, after the drilling of the well, water is gained in sufficient quantities for these purposes, the hotel will probably move from its present location to a site which has already been chosen by the director and other officials of the Park Service. This improvement is a necessity to the future development of Mesa Verde and it is hoped that by next summer construction will have been started on the new buildings. President Pyeatt of the Denver & Rio Grande Western Railway, during a recent visit to the park, expressed dissatisfaction with the present facilities and very much favored an improvement and betterment program.

Of equal importance from the standpoint of public service was the transfer of the stage line operating between Mancos and the park from its former concessioner, C. R. Beers, to this same subsidiary company of the Denver & Rio Grande Western Railway. The bus line now operates from the main standard gage rail head at Grand Junction, Colo., to Mesa Verde, thereby eliminating the long roundabout trip on the narrow gage line from Alamosa to Mancos. The time required to make the trip from Denver has been shortened by one full day. The stage line operates through the most scenic mountainous country in the United States between Ouray, and Durango, Colo.

J. O. Morris, of Gallup, N. Mex., was granted a renewal of contract for a period of five years to operate a daily stage service from Gallup, a station on the main line of the Santa Fe system, to Spruce Tree Camp, Mesa Verde National Park. At no time since its inauguration have fewer visitors availed themselves of this service than during the past year. The Santa Fe Transportation Co., operating from Santa Fe, N. Mex., and Winslow, Ariz., is also entering the park under the J. O. Morris permit. These regular all-expense tours, conducted by the Santa Fe Transportation Co. and known as the Sierra-Verde Cruise, are attracting greater attention each year.

IMPROVEMENTS AND NEW CONSTRUCTION

The Prater Canyon maintenance camp, composed of a stable, a storage shed for equipment, and a combined mess and bunk unit, was completed late in September. This was a much needed unit and has provided satisfactory quarters for help, equipment and stock engaged in the maintenance of the main highway. Two residences at park headquarters, one for the United States commissioner and one for the permanent ranger, are nearing completion. These two homes are of rock construction and the same architectural design as the other buildings of the administrative and residential area, all of which have been designed by Superintendent and Mrs. Nusbaum. Both will contain one large living room, two bedrooms, kitchen, bath, and ample closet space. There are now five stone residences at park headquarters.

The final reconstruction of the copper circuit telephone line was accomplished during the year. This brings to conclusion a 4-year program, during which standard poles have been placed in lieu of the old cedar posts, and a new copper wire circuit installed to replace the galvanized iron installation which had long since served its usefulness. Replacement of this old circuit by copper has greatly improved service to headquarters from the outside world and we hope will eliminate the heavy maintenance and inconvenience suffered during the winter because of snow and ice conditions. A decided improvement has been gained by placing the new line out of sight of the automobile roads wherever possible.

Drilling operations on the proposed deep test water well have been retarded because of the necessity of accumulating important data and other information before the advertising of bids. The problems have been studied from every angle in order that maximum drilling depth may be gained from the present appropriation. The engineering office at San Francisco informs us that these specifications are now complete and that the project will be advertised in the immediate future, in which event drilling operations should probably start between September 15 and October 1. This work will be carried on just as long as weather conditions permit in order that completion of the project may be realized before the opening of the park season.

The project is of inestimable importance to the development of Mesa Verde, for should we fail to find water in sufficient quantity to permit the necessary developments, all improvements will accordingly be delayed. The site chosen for the well has been selected after a careful study by Superintendent Nusbaum, members of the United States Geological Survey, and officials of oil companies operating in the surrounding territory. It has been necessary to go to the north side of a great volcanic dike that has projected through the Mesa Verde sandstone at a distance about a mile north of Spruce Tree Camp. The selected site for spudding in the well insures gravity flow to present storage facilities and thence to the developments at the administrative, industrial, and hotel areas.

It is interesting to note here that archeological investigations tell us that for the past 3,000 years a desperate struggle for water has been waged by the inhabitants of this region. The Cliff Dwellers, at a time about 1276 A. D., were undoubtedly forced from the Mesa Verde because of a long period of drought, and evidence remains to-day of the innumerable dams which they constructed for impounding the rainfall. If man, with his increased knowledge and mechanical appliances, can produce water from the deep strata of Mesa Verde, it will bring to an end this struggle of many centuries.

The original road construction in Mesa Verde National Park was projected for horse-drawn travel. With gradual improvement over a period of years, it was adapted to motor-borne traffic but did not in any way meet present-day standards of construction. The new north-entrance highway, except for the final contract, was located in so far as was practicable to obliterate the old roadway. At some points present high standards demanded an absolutely new location, thus leaving the scar of the old abandoned road section in evidence from the new. Through the cooperation of the landscape division and the Washington office, a reallocation of \$2,000 was made available for landscape work and an attempt will be made to blot out these disfiguring marks. A small amount of work has been accomplished and results are most gratifying. It was found, however, that transplanting of shrubs and brush could best be performed in the early fall and this project has been postponed until some time later in the season.

ROAD CONSTRUCTION, CONTRACT, AND FORCE ACCOUNT

The two major road contracts let in 1928 for new construction on the north-entrance highway were completed and accepted by the Bureau of Public Roads and Park Service officials in October, 1929. Project 1-A and 1-B combined, which consisted of reconstruction of present road and new construction, in all 5.58 miles, extends from the park entrance up over the great north cliffs of the mesa to what is designated as the Knife Edge section highway. The 1-D, Prater Canyon section, of all new construction, is 2.39 miles in length and extends from the opposite end of the Knife Edge to the head of Prater Canyon. These two stretches of road were formerly the most difficult to negotiate in wet weather.

With the new widening that has been accomplished by Park Service forces on the Knife Edge section, the road from the park entrance to the head of Moccasin Canyon is now improved and ready for surfacing, with the exception of one small section on the Knife Edge which has been designated as the 1-C-2 project and will be completed by contract during November, 1930. This 1-C-2 project will eliminate the most dangerous section on the present highway and one which has constituted a real menace in wet weather because of the narrowness of the road and the slippery formation known as "Mancos shale" in which the road is built.

Construction work on the main north-entrance highway is now in progress on the 1-C-2 Knife Edge section and the 1-E Park Point-Spruce Tree camp sections which have been combined into one contract and include grading and drainage only. The 1-C-2 section is between stations 756+00 to 778+00, and the 1-E section between stations 0+00 to 630+00, in all a total length of 11.39 miles. The contractor is the Pioneer Construction & Engineering Corporation, of Denver, and the contract price \$114,965. With the present rate of progress and reasonable weather these projects should be completed before the heavy travel season of 1931. With their completion the entire north-entrance highway will have been reconstructed so far as realignment and subgrade are concerned. The director and the chief landscape architect were particularly well pleased with the work of these contractors. All blasting has been accomplished in a careful manner. They have backfilled dirt into the abandoned roads to blot out old scars, and toe retaining walls have been placed at the base of all fills to prevent the scattering or sliding of loose rock and dirt. From now on visitors can be assured, when roads are dry, of a high-gear highway from the north entrance to park headquarters for the first time in the history of this park.

On July 1 force account work, which included widening, realignment, and improved drainage on the Knife Edge section of the north entrance highway was completed. Heretofore the Knife Edge, while affording one of the most spectacular views, was very dangerous during wet weather because of the narrowness of the road and the precipitous slopes of the north rim through which this road traverses. After this improvement work was completed the Knife Edge, with the exception of one short stretch which has been contracted, conforms with Bureau of Public Roads standards and is ready for the placing of gravel surfacing as soon as this work is undertaken by the service.

The \$10,000 for force account work on the interconnecting ruin roads, which is being accomplished by park forces under Park Service supervision, is nearing completion. Work on this stretch, which is about 3 miles in length, will care for necessary widening, rectification of bad curves and grades, and the installation of adequate drainage.

For the first time in the history of this park an improved 4-foot tread standard type of trail is being constructed. By September 1 approximately one-third of the contemplated program on this trail for the present year had been completed. Trails of this character will be a real inducement to visitors to enjoy the more remote regions and interesting ruins of the park.

A sum of \$2,400 will be expended during the latter part of September to construct a short scenic highway about 1 mile in length from the main north entrance road to the highest point on the Mesa Verde, known as "Park Point." The elevation of this great prominence above the floors of the surrounding valleys permits a panorama of unsurpassed grandeur. One may stand on this point and look far in the three adjoining States of Utah, New Mexico, and Arizona. Lofty ranges of the Rockies form the background, while the little towns of Montezuma County appear as miniature villages far below.

In the accomplishment of all force account work Navajo Indians are being used almost exclusively. An attempt is being made to teach these boys skilled trades such as carpentry, masonry, care of automotive equipment, etc., and it is most gratifying to see the way they take hold and apparently enjoy the opportunity to learn. Many of them return to the park for employment season after season, and our records show that a good number have been employed for eight and nine consecutive summers.

All clearing for road contract projects was accomplished by park forces.

PARK MUSEUM

The park museum has enjoyed one of the most active and successful years in its history. Many new and important acquisitions have been gained during the year. Other museums and scientific institutions are now cooperating with the park museum, presenting or loaning material to strengthen and round out exhibits of the early cultural epochs of the Mesa Verde which to this time have been far from comprehensive.

Through the cooperation of Charles L. Bernheimer, of New York City, Dr. Clark Wissler, of the American Museum of Natural History, and Earl H. Morris, of the Carnegie Institution of Washington, the American Museum of Natural History has made a permanent loan of the Basket Maker II material collected during the field season of 1929 in southeastern Utah by the Seventh Bernheimer Expedition. This addition is particularly noteworthy since a comprehensive display of the material of this early culture was drastically needed to illustrate the first known occupation of Mesa Verde by prehistoric inhabitants.

Dr. Junius Henderson, curator of the University of Colorado Museum at Boulder, Colo., presented an excellent example of the atlatl, predecessor of the bow of the later inhabitants, which was lacking in the material loaned by the American Museum of Natural History. Doctor Henderson later sent an excellent selection of Basket Maker III, or Late Basket Maker pottery that had been excavated by Earl H. Morris, leader of the University of Colorado Museum expeditions in the area just south of the park on the opposite rim of the Manco Canyon. Mr. Morris selected specimens which would strengthen the exhibit of the pottery of this culture that had been previously recovered from ruin within the park area.

Director Harold Gladwin, and Mrs. Winifred MacCurdy, of Gila Pueblo, Globe, Ariz., presented an excellent collection of 15 perfect type specimens of pottery from cultural areas in the southwest not represented in the park collections. While the archeological exhibits of the park museum are largely confined to material excavated within the park area, a limited amount of space is devoted to the display of comparative material from adjacent areas.

During the closed winter period 45 pieces of Mesa Verde pottery gained in previous excavations were mended and prepared for exhibition. All reference and study collections and material and collections awaiting preparation for exhibition or space in exhibit cases were removed from the miscellaneous storage facilities, cleaned, classified, and placed in the eight new, dust-tight, 3-door steel piling or storage units. These units accommodate 100 steel storage drawers. Storage space has thus been condensed to less than half its previous volume, making available additional display space in the fourth and last room of the present museum building. Additional storage, preparation, and work space is desperately needed, particularly so following the appointment of a park naturalist, who has greatly advanced the scope of the museum and educational work. An addition to the present museum building is contemplated for some time in the near future, this addition having been pledged by an interested park friend. Four new double-faced exhibition cases have been ordered for the installation of exhibits now ready for display.

EDUCATIONAL ACTIVITIES

Each year the direct and accumulated information of this area is presented to park visitors in better manner and form through the three main agencies developed for this purpose: First, a specially selected and instructed ranger-guide service which conducts all visitors to and through the major ruins; the park museum, with its associated activities; and, lastly, the informal evening camp-fire talks conducted by the superintendent and rangers, covering the broad aspects of the work of the National Park Service and the prehistoric culture of the Southwest. Following the camp-fire talk Navajo Indians from the re-

ervation give a series of songs and dances. This year, for the first time, an accurate check has been kept on the number of people availing themselves of these services, and the very important fact is brought to light that the average visitor inspects the museum at least twice during his stay. A total of 20,964 people availed themselves of the conducted ruin trips; 8,961 attended the camp-fire lectures, and a total of 21,011 visited the museum; in all, a total of 50,936 visitors was served by the park rangers and naturalist.

ARCHEOLOGICAL INVESTIGATIONS

Because of the absence of Superintendent Nusbaum during the winter no field work or excavations were accomplished. However, some little research was carried on in the museum.

Dr. A. E. Douglass, leader of the National Geographic tree-ring expeditions of the last decade, finally succeeded in erecting an unbroken tree-ring chronology extending from shortly before the year 700 A. D. to the present time. By means of this chronology pine and fir timbers, either sound or charred, found in ruins can be accurately dated if cut within the limits of the present chronology. Forty-nine beam cores or ends were collected from cliff-house structures within the park some years back. In his preliminary report, Doctor Douglass ascribed the date 1073 A. D. to the earliest beam of the series, one found in Cliff Palace, and the year 1262 A. D. to the latest, which was taken from Spruce Tree House, probably thus confining the construction of the principal cliff-dwelling structures in the park within this period of time. This contribution of Doctor Douglass has been of particular and outstanding importance in the annals of southwestern archeological research.

In the fall of 1929 Earl H. Morris and Superintendent Nusbaum definitely established the fact that the ruin heretofore designated as "Earth Lodge A" was a typical structure of the Basket Maker III period or culture and not a distinct type of new structure as had been previously supposed. Incomplete excavation of the site years ago led to this erroneous conclusion. Other structures of like type were found adjacent thereto. Normally this type of home site is found scattered along the rolling ridges that divide the watershed of the more level mesa lands. There are literally hundreds of such remains within the park area.

MAINTENANCE OF RUINS

Several of our most experienced stonemasons, with Navajo helpers, spent the months of May and June in repairing and strengthening the walls of ruins visited by the general public. The importance of this work can not be overestimated. Each year our cliff dwellings are being subjected to heavier traffic by the increased travel, and the element of time alone is an important factor. In the near future it will be absolutely necessary for this park to maintain a consistent annual program for the repair and maintenance of all excavated major archeological remains. The fact that an unexcavated ruin will stand indefinitely does not apply to ruins that have been excavated, since the wall-supporting earth is removed in the process.

PUBLIC CAMP GROUNDS

Potable water is available on the Mesa Verde only at park headquarters and because of this fact but one public camp ground is maintained. It is located under the piñon and juniper cedars on the rim of Spruce Canyon within a short distance of other park headquarters attractions. Here approximately 60 per cent of all visitors make their temporary home while in the park. Water is piped to convenient outlets, firewood for the convenience of guests regularly distributed, and sanitary facilities consisting of chemical toilets provided. A large log community house, which was moved from the headquarters area to the public camp ground, has proven an added asset. All buildings within the area are electrically lighted. One ranger is assigned to patrol duty on the camp ground, which is maintained in scrupulous order at all times. Much favorable comment has been voiced by visitors on the appearance, cleanliness, and privacy of these grounds. It is contemplated, with the moving of the hotel, to also move the public camp ground so that the one development for the accommodation of visitors will be centrally located. Furthermore, at its present location on the rim of Spruce Canyon space for development is too restricted, and with increasing visitors a larger and unrestricted area will be required.

GENERAL PARK MAINTENANCE

All roads and trails received the usual fall and spring maintenance, which included the cleaning of ditches and culverts, smoothing of roadbed, repairing of shoulders, etc. Until the abnormal rains of July the highways in this national park were in the finest condition of any roads in this section of Colorado. After the rainy season started excessive maintenance was necessary, and during the latter part of July retaining walls and roadway were completely washed out in two places. Fortunately, traffic was not seriously handicapped or delayed, but only by the employment of every available man and concentrated effort and overtime work were these roads maintained during the period of cloud-bursts.

These same cloud-bursts during July practically obliterated large portions of 4 miles of trail from park headquarters to the west side of the mesa. About one week of heavy and continued maintenance was required to place the trails in their former condition. Until the park highway is surfaced and trails are protected by oiling or some other water-shedding material, maintenance costs will be high and travel must normally increase or decrease in direct proportion to climatic conditions. All other features of park maintenance work, which has included the maintenance and repair of buildings, pipe lines, grounds, etc., have been kept current during the year.

JURISDICTION OF PARK LANDS

The presence of a United States commissioner in this park has had the desired effect in the matter of enforcement of rules and regulations, and particularly so in regard to hunting and poaching. There were but few violations during the season, and these of a minor nature.

James M. Dalton, Washington, D. C., was appointed the first commissioner for this area in February, 1929. He resigned his position August, 1930, and this vacancy was filled in May of the present year by Joseph H. Jackson, Mancos, Colo. Mr. Jackson has proven an excellent commissioner for this park.

FOREST INSECT CONTROL

Dr. W. W. Blackman, of the Bureau of Entomology, visited the park during May and made recommendations for the expenditure of \$900 on insect control. Work was immediately started and all infected trees cut and burned. The results of this work are satisfactory and fewer dead or dying trees are in evidence in the infected areas than during previous years.

NATURAL FEATURES

Because of the light winter snowfall and excessive drought that prevailed during April, May, and June, wild flowers of the area were not as abundant or plentiful as previous seasons. However, the July rains brought forth the Indian paintbrush with its brilliant red coloring, the purple aster, and that most spectacular of all our native flowers, the mariposa lily. Since the prohibiting of cattle grazing on the park lands the floral display is beautiful even during the driest of years.

Deer seem more abundant than ever before and have been noted by visitors and park employees close to headquarters even during the summer months. Heretofore it has been their habit to spend the summer in the higher mountain ranges to the north, but possibly the complete protection that is being offered them now, and their knowledge of safety, will keep them more and more within the park boundaries.

One large mountain lion was killed within the park during the year, and the small predatory animals such as bobcat, coyote, etc., are seen by many visitors.

MAIN APPROACH ROADS

Of great importance to the future travel of this park are two major road projects now under construction, one by the State of New Mexico and the other by the State of Colorado. In New Mexico 16 miles of new grading and surfacing from the Colorado State line to Shiprock will connect with the present improved and surfaced highways on either end. After the completion of this road Mesa Verde will have one of the finest approach roads of any park in the system.

Extensive work is being accomplished on the Wolf Creek Pass highway which when completed will form the shortest route between Denver and Los Angeles. Wolf Creek has always been a favorite road of many visitors because of its scenic attractions, and should, after its completion and improvement, induce many more tourists to visit southwestern Colorado.

A proposed Federal-aid project for the Forest Service, between Silverton and Durango, Colo., is now pending. If it is successfully carried through it will form an important link in one of the most scenic highways in our country. This is known as the Million Dollar Chief Ouray Highway and is perhaps the greatest inducement along the Mesa Verde for bringing visitors to southwestern Colorado.

HOSPITAL ACTIVITIES

Many patients, both visitors and employees, have been treated at the Aileen Nusbaum Hospital during the past year. The Indians are fast being educated to the benefits of modern medicine. During November of 1929 this hospital was responsible for saving the life of an employee who had been seriously hurt after being knocked down and run over by a Fordson tractor. Had it been necessary to move him in his critical condition death would have undoubtedly resulted.

CONCLUSION

It is recommended that one-half of the north entrance highway be gravel surfaced and oiled during the coming year as thorough settlement and compaction of fills and road surface has now been secured. The final grading and drainage contract will be completed in the spring of 1931, and this new section will be ready for surfacing the following year. Mud conditions during periods of heavy precipitation make this surfacing program immediately necessary, and imperative.

Landscape work, commenced for the first time this year, should be continued to completion. Scars of the old abandoned wagon road visible from certain sections of the new highway should be planted out, and unsightly roadside conditions eliminated. The Navajo Indians are particularly adept in such work.

The improved hotel and camping facilities together with the sewage disposal system should be accomplished as soon as the water situation is satisfactorily solved. Modern facilities are now demanded by park travel, and the present public utility operators within the park are only awaiting satisfactory water and sanitary facilities before commencing the extensive improvements contemplated under their permit.

MOUNT MCKINLEY NATIONAL PARK

HARRY J. LIEK, Superintendent, McKinley Park, Alaska

There has been no change in the permanent park organization, which consists of the superintendent and clerk in the administrative force and the chief ranger and four park rangers in the protection force, making a total of seven in all.

WEATHER

The weather conditions were ideal throughout the year, with very little snowfall during the winter months, and with just enough winds to sweep the high plateaus and mountain tops free, thereby affording plenty of forage for the large herds of caribou and sheep which winter in the hills.

The summer months have been beautiful, with very little rain and cloudy weather to obscure Mount McKinley, the paramount attraction of this park. The minimum number of days whereby the mountain was visible from Savage River Camp, averaged approximately 25 during each month.

CONSTRUCTION

This year's appropriation carried an item of \$500 to be used in the construction of new dog kennels. Except for the amount of expenditure, this project was one of the most important of all.

Heretofore all of the sled dogs used by the rangers in making their winter patrol have been kept at headquarters during the summer months, chained to their kennels with short chains, and with no possible freedom of movement.

They are always rearing and jumping against the chains in the attempt to break them, and sometimes this does happen. When it does the dog is generally mixed up with others in a general fight before a person can get to him and oftentimes killed.

The new individual pens, 40 in all, consist of wire netting strung on pole frames, and each dog is allowed a space 10 by 18 feet with his own sleeping kennel on the rear of his pen. This system also gives the tourist a chance to view the dogs without the danger of getting bitten. Although there have been no serious accidents so far, the rangers have always had to guard against this very carefully, especially when children were in the crowd, as the dogs are of a very vicious type.

PUBLIC UTILITIES

In keeping with modern times, the Mount McKinley Tourist & Transportation Co. has inaugurated a passenger airplane service extending from Savage River Camp to Mount McKinley and return, with numerous side trips.

Whereas this service was tried out much as an experiment, its ever-increasing popularity has destined this phase of travel to be one of the outstanding developments of the park. The opportunity thus afforded of getting a close-up view of the mountain, and the chance of seeing en route the many glaciers, rivers, and mountains, with their magnificent colorings, will always attract those who wish to see those places and things that are not visible from the automobile.

The public-utility operators have spent much time and money in the construction of a landing field at Savage River Camp, with the result that now a fine field 1,500 feet long is maintained and is considered to be one of the best in the North.

This company has just added to its present equipment four more automobiles. The dining room has been enlarged to accommodate 75 persons, and a number of sleeping tents also added so as to take care of the expected increase in travel.

TRAVEL

The travel into the park this year shows a 8.38 per cent decrease compared with last year, the total number of persons registering in 1930 being 951 as against 1,038 in 1929.

This light registration is probably caused by the hard times and unsettled conditions in the States. As the trip to McKinley Park is fairly expensive, it is to be expected that this park would feel the effects of any such business depression.

TELEPHONE SYSTEM

Approximately 70 miles of telephone system is in the course of construction, the work being done by contract and the time limit set for May 31, 1931. The contractors are taking advantage of the good weather before the snow comes and are rushing the work to completion. It is expected that service will be connected up by December 1, 1930.

The system is a one-way, grounded-wire, return system constructed on tripods and using a high-grade Copperweld wire, the specifications being governed by the practice of the Western Union and Bell Telephone companies.

ROADS AND TRAILS

Under cooperative agreement the Alaska Road Commission is constructing a highway from the park entrance, at Mile 348 on the Alaska Railroad, to a point near Mount Eielson, a distance of about 70 miles.

At this time 43 miles of one-way road have been completed for travel. The bridge over the east fork of Toklat River is completed, making a total of four large bridges constructed in this distance.

From Mile 43 the road extends along the side of a mountain for a distance of about 5 miles and as 3 miles of this are heavy rockwork, the progress has been rather slow in this section. This part of the highway is the finest in the park from a scenic standpoint, and is known as the high line, as it reaches an altitude of about 1,000 feet above the rivers and affords an unexcelled view of Mount McKinley and Muldrow Glacier.

From Mile 48 the road has been graveled for a distance of 3 miles, and from there on to Mile 62 preliminary work consisting of stripping moss and ditching has been completed.

There has been much maintenance work done on the highway leading from the station to Savage River Camp as well as on the stagecoach road to the head of Savage River, and the saddle-horse trail through the canyon is kept in good condition. All of the roads are in better shape this year than they have been in previous years.

WILD ANIMALS

The wild animals of the park have shown a good increase this year, probably due to the mild winter and the determined efforts of the ranger force to stamp out the predatory animals, such as the wolves and coyotes.

Whereas it is impossible to get an accurate count of the game with only five rangers trying to patrol 2,700 square miles, it is believed, from observations taken from the plane in flying over the mountains and covering places that heretofore man has never been, that the estimated number of 15,000 sheep that was submitted with the 1929 report is far below the actual number.

The number of caribou will probably be around 50,000 head during the spring and fall months, but during the winter possibly three-fourths of these will move south to the Valdez Creek country, where there is abundance of reindeer moss.

Grizzly bears, moose, foxes, wolves, coyotes, and wolverines are seen very frequently, and the ptarmigan are beginning to return to the park in numbers after an absence of nearly four years.

FISHING

Good grayling fishing is to be found in practically all of the small clear streams of the park. There are no trout except those which are to be found in a chain of 29 lakes which lie between the McKinley River and the Clearwater, and these do not take the baited hook or the fly. These trout average from 2 to 8 pounds and are of a species unknown to the waters of the streams in the States.

The grayling are small and average around 7 to 12 inches and can be caught only in the clear streams. Sometimes the best fishing is located in tiny streams that are less than 4 feet across and with hardly sufficient water in them to cover the fish.

MOUNT RAINIER NATIONAL PARK

OWEN A. TOMLINSON, Superintendent, Longmire, Wash.

GENERAL

The year 1930 has been easily the most successful year in the history of the park in every respect. All travel records have been broken by wide margins. Travel by private automobile has especially increased. Roads and camping facilities, as well as the public-utility operator's facilities, have been greatly improved and more people have derived greater satisfaction from this improved service than ever before.

Liberal appropriations for road and trail construction and maintenance made it possible greatly to improve this service. As a result of improved grades and dust-preventive oiling, more people used the trails than ever before and derived greater enjoyment therefrom. Weather was ideal through the season. Better service was rendered by the ranger force, 90 per cent having had the benefit of two or more years' previous service in the park.

The Yakima Park project deserves especial mention. Sufficient camping, sanitary, and other facilities will be available to open this new scenic center by July, 1931. At that time roads, trails, and Government and operator's buildings will all be ready to accommodate the expected flood of visitors. This engineering feat was accomplished under extreme difficulty, all supplies being hauled over 55 miles of mountain road, part of which was under construction. Public interest in this new development was stimulated by a preview caravan of 300 carloads of press and civic leaders who visited the development site July 20. Director Albright was present at this preview while on his annual inspection tour of Mount Rainier National Park.

The improved and dustproof roads and trails on the south side of the park were much appreciated and brought far more compliments and fewer complaints this year than ever before.

ADMINISTRATION

One ranger, one janitor, and one clerk-stenographer were added to the permanent park organization this year, bringing the total permanent force to 21. During the summer season the administrative organization was increased by one temporary clerk and two temporary telephone operators, the protective force by 15 temporary rangers, the educational department by four ranger-naturalists, the maintenance and construction department by two assistant engineers and 240 skilled and unskilled laborers, and the electrical force by one lineman. The greatest number employed in all departments at any one time was 305, the largest number ever employed in the history of the park.

Three cases of violation of park rules and regulations were taken before the United States commissioner for the park. One resulted in conviction and a \$20 fine. Two hundred and ninety-four persons were warned for minor infractions of traffic and other rules.

Appropriations totaling \$1,891,792.73 were allotted to the park during the fiscal year 1930. For general administration, protection, and maintenance \$120,270 was allotted; for emergency reconstruction and fighting forest fires, \$23,602.61; for roads and trails, \$1,747,920.12.

Revenues collected during the 1930 fiscal year totaled \$41,514.89. Automobile and motor-cycle fees contributed \$35,515, other revenues \$5,999.89. Total revenues show an increase of \$3,628.72, or nearly 10 per cent over last year.

WEATHER

The year 1930 was the driest and the second coldest year in the history of the State. Precipitation for the year was about 50 per cent of normal for the park as well as for the State and the whole Northwest. Snowfall at Paradise Valley was about 60 per cent of normal. As a consequence there was somewhat less than normal activity in winter sports. But deficient snowfall also made it possible to open roads and trails three weeks earlier than usual. Weather was ideal for travel, yet, due to high humidity, fire hazard was not extreme.

The minimum temperature for the year was -1 , January 20. The mean temperature for January was the lowest recorded in 41 years. The maximum temperature was 93 on July 12. Both figures are for park headquarters at Longmire, elevation 2,732 feet.

TRAVEL

The growing popularity of Mount Rainier National Park was strikingly demonstrated this year by the prodigious influx of visitors. New daily, weekly, monthly, and annual travel records were established by wide margins.

The total number of visitors this year was 254,927 entering in cars, while 10,693 entered by stage and rail, as compared with 11,473 of last year's stage and rail figures, a decrease of 780, or 6.8 per cent.

The greatest travel day in the history of the park was July 26, 1930, with 2,201 cars and 9,196 motorists. The greatest travel week was July 23-29, 1930, with 5,048 cars and 21,335 persons. The greatest travel month was August, 1930, with 21,147 cars and 90,644 passengers. This record breaking is attributed to the improvement of the roads in the park as well as the approach roads and to the ideal weather conditions.

The numbers using the developed camp grounds were as follows: Longmire, 58,525 persons; Paradise, 79,376 persons; Carbon River, 6,950 persons; White River, 23,718 persons; giving a total of 168,569, exclusive of undeveloped grounds.

Summary, 1930

Methods of transportation	Nisqually entrance		White River entrance		Carbon River entrance		Ohanapecosh	Total	
	Cars	People	Cars	People	Cars	People	People	Cars	People
Private autos	49, 868	203, 825	10, 358	39, 695	2, 606	9, 074	-----	62, 832	252, 594
Stages	707	10, 693	-----	-----	-----	-----	-----	707	10, 693
Motor cycles	34	44	-----	-----	-----	-----	-----	34	44
Foot and horse	-----	-----	-----	-----	-----	-----	2, 289	-----	2, 289
Totals	50, 609	214, 562	10, 358	39, 695	2, 606	9, 074	2, 289	63, 573	265, 620

PROTECTION DEPARTMENT

One ranger was added to the permanent organization this year, bringing the total to seven permanent rangers, an assistant chief ranger, and the chief ranger. During the summer months 15 temporary rangers were employed.

Winter activities.—In the fall, winter, and spring, regular and special patrols were made to prevent poaching, to observe snow and game conditions, and to protect hikers, wild life, and natural features. Other activities included repairing telephone lines, patrol cabins, station buildings, and trails, protecting winter visitors, camp-ground management, police and information service, and numerous other services to the public.

Summer activities.—Information, traffic regulation, entrance checking, camp-ground management, police and protection duties, fire and special patrols, and a host of other duties connected with serving park visitors were performed by the summer force of 22 rangers.

Forest fires.—A road contractor on the west-side highway was responsible for the only serious fire of the year, October 23, 1929. About 40 acres of timber were burned. The cost of extinguishing the fire—\$1,000—was borne by the contractor.

Over 40 fires were spotted by lookouts and fire chasers and extinguished before serious damage resulted. It is largely due to this vigilance and quick action, made possible by increased fire-protection personnel, that no serious fires developed. A much larger protection force is, however, urgently needed.

Precipitation was almost nothing (0.20 of an inch) during the summer, but humidity has been high throughout the summer and no serious lightning storms have arisen.

J. B. Coffman, National Park Service fire-control expert, inspected the fire equipment and organization from June 17 to July 2 and outlined a comprehensive 5-year fire-control program.

Trail maintenance.—The park-trail system of 242 miles was maintained by district rangers and small crews under supervision of the chief ranger. For the first time in many years it was possible, with the aid of protection funds, to open all trails at least to foot travel. Temporary signs and markers were placed on all trails frequented by visitors. More than 100 metal trail signs were placed in the Longmire and Paradise districts.

Forest-guard training camp.—A very successful fire camp of instruction for temporary rangers was held at Longmire June 27 and 28. Fire Control Expert J. D. Coffman assisted the chief and assistant chief rangers in conducting the instruction. We were particularly fortunate this season in having Assistant Supervisor Fromme, of the Rainier National Forest, assist at the training camp by acting as instructor in the use of the latest equipment and the most approved fire-fighting methods. This cooperation on the part of national forest officials is much appreciated and has resulted in helping to build up a more efficient organization for park and national-forest protection.

First-aid training.—First-aid training was conducted throughout the winter months under the direction of Assistant Chief Ranger Macy and Ranger Davis. All permanent rangers are now fully qualified under the Red Cross rules as instructors in first aid. Many of the other permanent employees have also completed the first-aid training course.

Insect control.—About 300 trees infested with the white-pine beetle (*Dendroctonus monticola*) were cut in the Longmire and Ohanapecosh areas. About 125 trees still remain to be cut on the west-side highway and near Longmire. These are the only areas known to be seriously infested with this pest.

A survey conducted in October, 1928, by C. C. Strong, assistant forester, and P. S. Simcoe, of the office of blister-rust control, Bureau of Plant Industry, Department of Agriculture, showed that white-pine blister rust was a serious menace to the white pine of the park. An appropriation of \$5,200 was made available and work started June 16, 1930, on the eradication of the wild currant and gooseberry bushes which spread this disease. The whole Longmire area and the Silver Forest were covered. These are the two most conspicuous white-pine areas in the park. A survey was also started of other white-pine areas with a view to protecting them from rust. White-pine trees are not abundant in the park, but in some areas they are of inestimable scenic value.

NATURAL FEATURES AND WILD LIFE

The outstanding natural event of the year was the drastic deficiency in snowfall. Snowfall was only 60 per cent of normal throughout the park. As a result, crevasses near the summit of the mountain were wider and more extensive than usual. Climbs were successfully made by all three routes, however. The north-side route leading up from Yakima Park is becoming more and more popular and will be much used with the opening of the new Yakima Park Road in 1931. A shelter cabin is badly needed, however, at Steamboat Prow, the starting point of the trip up the Emmons Glacier.

Trails were opened up three weeks early and, due to the improvements, which included widening and oiling for dust prevention, together with the efforts of all rangers and ranger-naturalists to interest visitors in hiking, more people used the trails on the south side of the park than ever before. This increased usage of the trails is most gratifying, because it is only through their use that the best scenery of the park may be enjoyed.

Glaciers.—All the major glaciers continue to retreat each year from 40 to 100 feet, depending on their size, location, and the topography of their valleys. The Nisqually Glacier retreated only 70 feet this year as compared with 89 feet in 1928. This decreased retreat seems to be due to topographic features, however, and not to lower temperatures or lessened snowfall. The terminus of the glacier is at present sheltered by a deep canyon, which protects it from the rays of the sun. The surface of this glacier, as well as all others, shows the effect of steadily rising temperatures. It is quite noticeably decreasing in thickness.

Animals.—Black bears have increased prodigiously in both numbers and appetite. Their mania for wrecking cars and tents to get at the food contained therein has created an administrative problem both at Longmire and Paradise camp grounds. A trap was constructed from a steel culvert and four of the worst offenders were taken for a ride to distant corners of the park. But some of the bears returned and the problem remains.

Deer thrived during the mild winter and have increased.

Mountain goats, also, are increasing. Large herds and many kids were reported from all sides of the mountain.

Foxes are numerous and frequently seen.

The predatory animals—cougars, wolves, bobcats, and coyotes—are rarely seen and do not seem to be increasing. Two wolverines were reported in a little-frequented section. These are the first we have seen in 10 years.

Beaver seem to be on the increase at Fish Creek and at Kautz Creek. They were once plentiful in the park, but virtually disappeared until the above colonies were discovered last year.

Other smaller animals and birds seem to be increasing at a normal rate.

The estimated number of wild animals is: Black bear 250, Columbia black-tailed deer 600, white mountain goat 275, cougar (mountain lion) 4 to 6, timber wolf 10 to 20, coyote 25 to 30, eagle (bald and golden) 10 to 30.

MAINTENANCE DEPARTMENT

The general foreman has charge of this department and supervises the maintenance and upkeep of all roads, buildings, camp grounds, sewer systems, water-supply and garbage-disposal systems, machinery and other equipment, snow-removal work, and road oiling. This department cooperates with the protection and electrical departments in maintaining trails and telephone lines.

This department maintains and repairs 42 miles of automobile road, 240 miles of trails, 150 miles of telephone lines, 4 large and 4 small public camp grounds, 9 patrol cabins, 5 permanent ranger stations, 4 summer ranger stations, 10 employees' cottages, administration building, temporary museum, 2 large community buildings, 9 utility buildings—including warehouse, repair shop, equipment sheds, dormitory, bunk house, and mess hall—and 30 other miscellaneous structures such as comfort stations, small tool sheds, and cabins for temporary employees.

All maintenance work was efficiently done, but insufficient funds made complete maintenance impossible. Costs continue to mount because of increasing use of park facilities by visitors, and deterioration is rapid because of the severe climatic conditions—appropriations do not keep pace.

There is particular need of an all-year plumber. At present none is available during the winter months when he is most needed.

The chief mechanic and his assistant repaired all of the park machinery as required. Much of their time was spent on repairs to obsolete machinery, trucks, tractors and road graders received from war surplus stock and maintained only at great expense and difficulty.

Maintenance and construction was greatly facilitated by the purchase of 6 heavy-duty trucks, 3 compressors, a large tractor, and 5 light trucks.

EDUCATIONAL DEPARTMENT

C. Frank Brockman is the park naturalist in charge of this department. During July and August 4 ranger-naturalists were added to his staff—2 at Paradise, 1 at Longmire, and 1 at White River public camp.

Lecture service.—One hundred and forty-five lectures were delivered during the year to 31,981 persons. At Paradise one-half hour was allowed the naturalist on the public-utility operator's time each night. Lectures were also given four nights a week at Longmire and two nights a week at White River public camp. The naturalist gave several lectures to interested groups outside the park, donating the receipts to the park museum library.

Guide service.—During the summer short walks were conducted daily at Paradise, four times a week at Longmire, and twice a week at White River public camp. Longer hikes were also conducted twice a week at each point. The total persons taking these trips was 4,171.

Nature trails.—A new nature trail from Glacier Bridge to the snout of the Nisqually Glacier was constructed this year. Geological formations were labeled, telling the whole story of the mountain as it is here laid bare by the action of the glacier. This proved to be probably the most popular trail in the park. Two nature trails each were maintained at Paradise, Longmire, and the White River public camp, along which the flowers, trees, and other features were tagged for easy identification. Estimates made of the number of visitors using these trails during July and August total 76,000. No attempt was made to check attendance on these trails during the remaining months.

Publications.—Nature News Notes were issued monthly during the winter and semimonthly during the summer, 9,375 copies being franked to interested persons. So many requests have been received for this nature magazine that drastic measures have been necessary to keep the mailing list within the prescribed limit of 500. Work was continued on the park encyclopedia. Already this compilation has proved invaluable on numerous occasions. Trail guides were prepared for the new Yakima Park scenic center.

Research and technical cooperation.—The park was fortunate in having Miss Elizabeth E. Morse, secretary of the California Mycological Society, at Longmire during most of July. With the cooperation of the naturalists, she made a careful study of the fungi of the park, donating her time. She has promised to present a complete fungi display to the museum when a suitable place can be found for it. Two species of fungi were found that were apparently hitherto unknown to science. If they prove to be such, they will be named *rainerii*.

A map of forest types has been completed. Other than this, the park naturalist has had no time for research, due to the press of other work and lack of sufficient personnel.

Through lectures, publications, nature trails, and guide parties, 179,118 persons were served by the educational department this year, an increase of 69,118 over last year.

ENGINEERING DEPARTMENT

Acting Resident Engineer R. D. Waterhouse, assigned to this park from the chief engineer's office during the construction season for the past four years, has continued in charge of this department. Two assistant engineers, with crews of five men each, were employed on the Yakima Park development project. The following projects were constructed this year:

Buildings.—The administration building at Longmire was completed. Heating and lighting systems were installed in the Paradise and Longmire community buildings. Three duplex comfort stations of rustic architecture were constructed at Yakima Park, and the first unit of the administration building was completed. This building is patterned after the blockhouse of frontier days and stands on an eminence dominating the whole plateau. Construction

of two comfort stations and a water system for the new White River entrance was postponed until June, 1931, when the Klickitat Bridge on the new road will be completed, permitting hauling of supplies. A frame lookout station was constructed on the ridge above Sunset Park on the west side of the park. Equipment shed No. 4 at Longmire was remodeled as a storage room for fire tools and equipment.

For the Yakima Park development \$97,150 was available. Of this amount \$3,600 was allotted for comfort stations, \$15,200 for a sewer system, \$14,000 for water-supply reservoir, \$19,350 for camp-ground development, \$5,000 for an administration building, \$15,000 for parking areas, \$15,000 for subsidiary roads, and \$10,000 for foot trails. These funds enabled sufficient progress to provide accommodations for tourists at the beginning of the 1931 season, when the new recreation center will be opened. Additional money will, however, be required to extend the roads, trails, and water system next year and to provide a generating plant and electrical system.

The engineering force deserves especial commendation for the speed and efficiency with which this work was accomplished in the face of many difficulties.

Trails.—Reconstruction and improvement were carried on over 1.3 miles of Wonderland Trail at end of Carbon River Road and 5 miles of Ipsut Pass Trail. About 1.5 miles of the new Tatoosh Trail was completed. Boy Scouts of Troop 65, Seattle, commanded by Scoutmaster Clark E. Schurman, constructed 1.5 miles of pioneer trail from Klapatche Park to St. Andrews Park, donating their services and furnishing their own tools. About 5 miles of the Sourdough Trail in Yakima Park were completed. A stretch of the Paradise-Longmire Trail above Narada Falls 4 miles in length was relocated and reconstructed.

A trail oiler was purchased and the following trails oiled: Skyline Trail, 5 miles; Reflection Lakes Trail, 1 mile; and the Nisqually Glacier Trail, 0.6 mile. An immediate increase in the popularity of these trails was noted.

Roads, minor projects.—A 24-foot road 0.8 mile long was built into the Shadow Lake area in Yakima Park. From this road an 18-foot road was extended 0.5 mile to a stone quarry, another 18-foot road leads 0.8 mile to Shadow Lake, with a 0.3-mile branch to a picnic area. All were partially surfaced with crushed rock.

The Ricksecker Cutoff, 0.8 mile, and the Inspiration Cutoff, 0.8 mile, were regraded and surfaced.

LANDSCAPE ENGINEERING

Chief Landscape Architect T. C. Vint visited the park several times during the year and either in person or through his assistant, Associate Landscape Architect Davidson, directed all landscape matters in connection with road and trail location and construction and the construction of bridges, buildings, and other improvements, including also the extensive improvements of the Rainier National Park Co. Evidence of the landscape division's work is now seen along all of the roads, trails, camp grounds, and other places where improvements have been made during recent years. The excellent work of Mr. Davidson in planting shrubbery and lawns at the administration area at Longmire Springs and in assisting the permanent employees in landscaping their residences is worthy of special mention. The much-improved appearance of the headquarters grounds has been most favorably commented upon. This work has been done with extremely limited financial assistance. It should be encouraged by year-to-year appropriations for that purpose.

Roadside clean-up.—Under the supervision of Mr. Davidson, roadside clean-up was begun for the first time in the history of the park. With the \$5,000 available the roadside from Narada Falls to Paradise was immensely improved. This work has received much favorable comment from the public and should be continued.

ELECTRICAL DEPARTMENT

The park electrician, Arthur W. Collens, is in charge of all telephones and electrical work of this department. Electrical current is purchased from the Rainier National Park Co.'s power plant on the Paradise River 2 miles above Longmire. A total of 84,856-kilowatt hours of current was consumed for lighting residences, public buildings, camp grounds, and power equipment.

The Rainier National Park Co. has completed arrangements for supplying much-needed additional current from outside the park.

Telephone system.—One hundred and twenty-five miles of single-grounded line were maintained for protection purposes, besides two metallic circuits connecting Paradise Valley with the outside lines. Special effort was made to improve outlying lines between fire lookouts and ranger stations. Two automatic printing machines were installed in the Longmire telephone exchange by the Pacific States Telephone & Telegraph Co. These machines more than double the capacity of the Longmire office for handling telegrams.

PUBLIC UTILITIES

On October 22, 1929, Mr. T. H. Martin, general manager of the Rainier National Park Co. since its organization, was retired from active management of the company on account of illness. In recognition of his long and faithful service and in order to make use of his experience he was designated as advisor to the president of the company. Mr. P. H. Sceva, who has been Mr. Martin's assistant for many years, was promoted to the general managership.

The installation of plumbing so that the 38 rooms in the main building are now provided with running water, the repainting and varnishing of the interior of the entire building, and the refurnishing of all bedrooms in the annex, together with exterior painting, has greatly improved the appearance of the entire Paradise Inn. This general renovation has already offset to a considerable extent the unfavorable comment on the run-down appearance of last year.

The most important improvement undertaken by the Rainier National Park Co. was the construction of a modern housekeeping cabin unit in the upper half of the free public camp ground. A large service building, containing cafeteria, sales rooms, shower baths, comfort stations, and 40 bedrooms to serve the cabin unit, and 275 cabins were completed late in the fall and will be ready at the beginning of the 1931 summer season. It is planned to add about 250 additional cabins to this unit in 1931. With the completion of the new housekeeping cabin unit the old Paradise tent camp, which has been so unsatisfactory, will be abandoned. The building will be used as summer offices for the company and dormitory and dining facilities for employees. A new warehouse was constructed adjacent to this Paradise camp building to house the laundry, ice-cream plant, and supplies. The new service building constructed in the housekeeping cabin unit will also serve as a winter lodge, with accommodations for about 100 guests.

Six and a half miles of power line were constructed by the company along the Nisqually River Bar to connect with the Puget Sound Power & Light Co. at Nisqually Entrance. Power will be purchased from this company to supplement that generated by the Paradise River plant, which was incapable of furnishing sufficient current for all purposes. With an ample supply of current, complete electrical heating equipment will be installed at Paradise Inn and at the new housekeeping cabin unit in Paradise Valley. Lack of proper heating facilities has been one of the chief causes of complaint of guests at Paradise Inn and Paradise Camp. It is hoped with the new source of electrical supply there will be no further cause of criticism in this respect.

Keeping pace with the Government plan of development in Yakima Park, a service building, containing cafeteria, salesrooms, and about 40 bedrooms, together with 200 housekeeping cabins, were constructed during the late summer and early fall by the Rainier National Park Co. in Yakima Park. This unit is similar to the one constructed in Paradise Valley and will be in readiness to accommodate visitors as soon as the road is opened and the Yakima Park area made accessible for travel.

Authority was granted by the director on August 15 for the construction of a 9-hole golf course in Paradise Valley. Construction began August 18 and is expected to be completed by August 1, 1931. This is in the nature of an experiment.

ROAD DEVELOPMENT

All major road development continued under the supervision of the Bureau of Public Roads. Engineers of this bureau cooperated in every possible way with the landscape division and park superintendent in carrying out National Park Service policies and ideals with reference to the location of the routes and

protection of the landscape and natural features during construction. This fine cooperation is deeply appreciated.

The following projects were under construction on September 1, 1930:

Nisqually Road, Route 1.—Longmire section, 12 miles asphaltic macadam (paving); contractor, Mitchell Bros., of Seattle, Wash. Six and six-tenths miles to Longmire programmed for completion this fall, the remainder to be finished by July, 1931.

Westside Highway, Route 2.—Round Pass section, 9 miles completed in 1929. Opened to travel on July 4, 1930.

Klapatche Ridge.—North Puyallup section, grade 7.7 miles. Contractor, Elick & Co., of Seattle. This project scheduled for completion in 1931.

Klapatche Ridge.—Sunset Park Clearing, 1.5 miles. Contractor C. R. Johnson, of Portland, Oreg. Programmed for completion in 1931.

Bridges.—South Puyallup and St. Andrews Creek Bridge. Contractor, W. T. Butler Co., of Seattle. Programmed for completion in 1931. These bridges are concrete arches faced with granite and having stone railings.

Yakima Park Highway, Route 3.—Sunrise Ridge to development center, 3.32 miles. Grading contractor, A. C. Goerig. Will be completed this fall.

White River Bridge to Yakima Park section, 11.6 miles. Crushed rock surfacing. Contractor, A. C. Goerig, Seattle. Programmed for completion this fall.

Klickitat Creek Bridge. Concrete, faced with stone. Contractor, J. F. Ward, of Seattle. To be completed in 1931.

Frying Pan Creek Bridge. Concrete abutment, steel girder. Contractor, Albert F. Berni, of Portland, Oreg. To be completed in 1931.

Surveys.—Stevens Canyon—Cayuse Pass Highway, Route 4. Location survey in process from Inspiration Point on Nisqually Road. First 2 miles located at point near Reflection Lakes. From here two preliminary lines carried to Muddy Fork of the Cowlitz River, thence various reconnaissance lines to Cayuse Pass. It is expected that permanent route from Reflection Lakes to Muddy Fork and tentative location from that river to Cayuse Pass will be decided during the winter of 1930.

RECOMMENDATIONS AND CONCLUSIONS

Funds were available this year to establish three fire-patrol stations in regions of greatest fire hazard. The record of this first small detection squad proves the inestimable value of such a force in fire prevention and fire control. It is hoped that a more adequate organization will be built around this first small nucleus.

Only moderate appropriations for a period of five or six years are necessary to build up a protection organization that will have a fair chance of combating the destructive forces which constantly menace the park's beauties.

With the throwing open to automobile travel of the Yakima Plateau area in 1931 the administrative problems of the park will be doubled. There will be practically as much travel and as many activities in Yakima Park as there are now in Paradise Valley. Due to the great distance from park headquarters and lack of telephone or other rapid communication facilities it is essential that a full force of rangers, ranger naturalists, and other personnel be provided in order to protect the area and serve park visitors. The only means to reach Yakima Park from Longmire by automobile requires a detour of 135 miles over State roads. Being separated by this distance makes practically two parks as far as administration and operation are concerned. It is essential that construction work on the east side road be started at the earliest practicable date and prosecuted with the utmost dispatch so that a connecting road can be made available as soon as possible. On account of the physical difficulties to overcome, such a connecting road can not possibly be completed in less than six or seven years. By that time it is estimated that the travel to Yakima Park will have almost equaled the total number of visitors that now come to the park.

It is with keen pleasure that I express my appreciation for the hearty support and assistance of the Washington and San Francisco offices and the various field officials, and as I conclude this report I want especially to acknowledge my thanks for the fine cooperation of the personnel of the National Park Service and Rainier National Park Co. in serving visitors during the year 1930.

PLATT NATIONAL PARK

WM. E. BRANCH, Superintendent, Sulphur, Okla.

ADMINISTRATION

The superintendent's position at Platt National Park was given a competitive civil-service status in January, 1930. The permanent park personnel consists of a superintendent, clerk-special disbursing agent, two rangers, and four laborers. This force is increased by the addition of three temporary laborers and one garbage man during the summer months and other per diem employees both skilled and unskilled as required.

SPRINGS

The park is located in the vicinity of the Arbuckle limestone uplift and in a region of caverns and abundant springs. Thirty-two different mineral springs have been identified on the park. However, the principal springs are the Bromide, Bromide No. 2, and the Medicine in the western part; the Black Sulphur, Pavilion, and Hillside Springs in the central part; and the large Antelope and Buffalo Springs in the extreme eastern part of the park. The reputed therapeutic properties of the principal mineral springs are attracting considerable attention.

Travertine Creek, which receives 5,000,000 gallons (estimated) of clear, cold water daily from Antelope and Buffalo Springs, has been a source of great pleasure to the people from the drought-stricken lands in this section.

TRAVEL

The park not only attracts health seekers but thousands come for the pleasure of camping out. It is becoming the Mecca for reunions, especially family reunions. During the travel year 1930, 178,188 visitors and 64,057 campers entered Platt as compared with 204,598 visitors and 60,985 campers last year. The large decrease may be accounted for by the extremely cold winter and hot dry summer.

TOURIST ACCOMMODATIONS

Platt is open all year to the public. Three free, large public camp grounds are maintained, one in the western part, the Bromide camp; one near the central portion, called Central camp; and one in the central eastern portion, called Cold Springs camp. These camps are furnished with fresh running hydrant water, electric lights, and modern toilets. Community houses are provided at Bromide and Cold Springs camps. During the summer months all these camps are used to capacity. For the use of those who do not care to camp there are many hotels, boarding houses, and modern camp cottages in the city near by.

SANITATION

Owing to the large crowds that come to Platt, the sanitation problem is of vital importance. All garbage and refuse is daily removed and disposed of and the camp grounds are sanitary and inviting at all times. Toilets are inspected regularly.

Favorable steps looking toward the extension of the sewer system and the construction of a disposal plant have been taken. The sewer system is to be used jointly by the city of Sulphur, two State institutions, and the park. The city has voted a \$30,000 bond issue for this purpose, and the Park Service has intimated favorable consideration will be given the appropriation of \$15,000 for the park's share of the cost.

ROADS AND TRAILS

There are 11 miles of roads and 3 miles of trails in the park. All camp grounds are reached by modern improved roads, while the entire length of the park east and west is traversed by a graded, graveled road. In cooperation with the Park Service the State of Oklahoma maintains a standard highway

north and south across the park. This road is a part of two important State highways. The Park Service and the State are considering paving this road in the near future at a cost of \$10,000 per mile. Invitations for bids for paving with concrete of Davis Avenue at Rock Creek Bridge have been circulated and it is hoped this important project can be completed early this fall. Plans and specifications are being drawn up for the construction of a retaining wall and walk leading to Bromide pavilion to replace the old wooden walk now used, and funds are available to complete graveling some 2 miles of road in the eastern part of the park.

PROTECTION

By almost heroic efforts bootlegging has been practically eliminated from the park. Located as it is against the city of Sulphur and near the oil fields, the park's protection force is inadequate. There should be two rangers on duty at night and two during the day all year and this force should be increased by two temporary rangers during the summer months. As it is, of necessity, in order to enforce law and order, the superintendent and ranger patrol both night and day.

WILD ANIMALS

In addition to 9 elk, 3 buffalo, and 6 white-tail deer in the animal paddocks, the park abounds with wild life. There are birds of many species, including several large coveys of quail. Also there is a large number of small fur-bearing animals, such as squirrels, skunks, civet cats, muskrats, weasels, rabbits, and opossums.

WEATHER

Abnormal weather conditions existed throughout most of the year. The extreme cold weather during the winter months was without recent precedent; while in marked contrast the summer has been one of extreme heat and drought.

ROCKY MOUNTAIN NATIONAL PARK

EDMUND B. ROGERS, Superintendent, Estes Park, Colo.

GENERAL

The authorized permanent staff of Rocky Mountain National Park, with the park naturalist position authorized this year, consists of 13—superintendent, assistant superintendent, chief ranger, 4 rangers, 2 clerks, general foreman, auto mechanic, and storehouse keeper. The park naturalist position has not been filled. On April 1 Assistant Chief Ranger McLaughlin, of Yellowstone, was transferred to Rocky Mountain as chief ranger to fill the vacancy created in March, 1929, by the promotion of John C. Preston to assistant superintendent. During the summer season the force was increased by an engineer from field headquarters, 2 clerks, 16 rangers, and an assistant mechanic.

On June 21, 1930, a bill introduced by Congressman Edward T. Taylor, of Colorado, was approved, authorizing the President, upon recommendation of the Secretary of the Interior, to revise the boundaries of Rocky Mountain National Park within certain defined limits by proclamation. The additions to the park authorized by this act comprise a total of 35.2 square miles, and the areas concerned lie in the Grand Lake and Never Summer Range districts on the west boundary of the park, and the Fall River and Big Thompson Valleys on the eastern slope of the Continental Divide.

In accordance with this act the President, by proclamation signed July 17, 1930, added to the park the Never Summer Range area comprising 22.1 square miles. This addition is one of great scenic qualities and consists of a beautiful U-shaped valley embracing the headwaters of the Colorado River and extending on three sides to the crest of the Continental Divide, a series of rugged, glaciated, snow-covered peaks.

No fatal or serious accidents occurred during the year.

Cash appropriations allotted to the park for the fiscal year 1929-30 were as follows:

Regular park appropriation.....	\$92,360.00
Donations:	
Mosquito control.....	\$249.61
Snow removal.....	1,066.80
	<hr/>
	1,316.41
Roads and trails funds allotted to this park (including \$152,000 unappropriated) not included in previous report.....	578,600.05
	<hr/>
Total	672,276.46

Revenues received were as follows:

Concessions.....	\$4,075.92
Donations.....	1,539.95
Timber sales.....	145.58
Miscellaneous.....	249.76
	<hr/>
Total.....	6,011.21

INFORMATION AND EDUCATION

One thousand six hundred and seventy-four people were served at the information office in the administration building. Sixteen thousand free Government publications—maps and information pamphlets—were distributed by this office. Six hundred and thirty-eight Government publications, totaling \$171, and 211 private publications, totaling \$75.15 in value, were sold through this office during the year.

Educational activities were handicapped due to the lack of a naturalist. However, nature trips were conducted by the rangers stationed at Bear Lake, in which 867 people participated; and three issues of Nature Notes were published and distributed. A new booklet on Birds and Plants of Rocky Mountain National Park was published for sale at 50 cents a copy; plants by Information Clerk Ruth E. Ashton and birds by Dean Babcock, a former ranger and local artist. The other publications on sale are Evergreens of Colorado, by Longyear; The Evergreens of Rocky Mountain National Park, by Smoll; The Small Mammals of Colorado, by Warren; The Mountain Peaks of Colorado, by Toll; Mountaineering in Rocky Mountain National Park, by Toll; Geologic Story of Rocky Mountain National Park, by Lee; The National Parks Portfolio, by Yard; Oh Ranger, by Albright and Taylor; and Roads and Trails of Rocky Mountain National Park, by Close.

An effort is being made toward accumulating a reference library for Rocky Mountain Park. During the past season 57 books were acquired for this purpose, some of which were purchased, but most of which were donated by friends of the park. These books are primarily on the subjects of natural and local history.

TRAVEL

The number of park visitors this year is 6.7 per cent less than last year. Rangers were on duty at four gateways from June 15 to September 15, inclusive. The travel count was taken for a period of nine hours per day. Although there is no entrance fee, the practice of stopping all cars at the park entrance was inaugurated this season. The primary object of the change was to give the Park Service a contact with the visitors that heretofore has been lacking and to convey to both the visitors and the local people the feeling of the existence of a national park. The result has been highly satisfactory.

The following tabulation shows the actual count and the total estimated travel:

	Total travel	
	Cars	Persons
Actual count at four gateways:		
June 15, to 30, inclusive, 1930.....	5, 873	19, 627
July, 1930.....	15, 958	55, 839
August, 1930.....	19, 179	68, 367
Sept. 1 to 15, inclusive, 1930.....	4, 146	12, 983
Total actual count.....	45, 156	156, 816
Estimated:		
Travel outside nine hours checking period, June 15 to Sept. 15, 26 per cent.....	13, 095	40, 772
Travel at other entrances, June 15 to Sept. 15, 13 per cent.....	3, 780	19, 786
Travel during months when no count is kept:		
October, 1929.....	700	2, 600
November, 1929.....	150	500
December, 1929.....	170	500
January, 1930.....	190	600
February, 1930.....	160	500
March, 1930.....	300	1, 000
April, 1930.....	600	2, 000
May, 1930.....	2, 300	8, 000
June 1 to 14, inclusive, 1930.....	3, 500	12, 800
Sept. 16 to 30 inclusive, 1930.....	3, 000	10, 000
Total estimated travel.....	73, 101	255, 874

The actual count by type of travel is as follows:

	Total travel	
	Cars	Persons
Private cars:		
General.....	37, 623	131, 581
Camping.....	1, 873	6, 506
Repeaters.....	3, 149	7, 344
Rocky Mountain Parks Transportation Co. cars.....	1, 159	7, 069
Hotel cars.....	258	891
Rent cars.....	19	137
Trucks.....	1, 023	1, 674
Motor cycles.....	52	75
Horseback.....		1, 347
Pedestrians.....		192
Total.....	45, 156	156, 816

The actual count by automobile entrance is as follows:

	Total travel	
	Cars	Persons
Fall River Road, at Horseshoe Park.....	17, 209	61, 473
Highdrive, at Deer Ridge.....	5, 448	19, 654
Bear Lake Road, near Glacier Basin camp ground.....	10, 292	37, 843
Grand Lake.....	12, 207	37, 846
Total.....	45, 156	156, 816

The Fall River Road, which is the principal scenic road of the park, and one of the highest roads of the country, crosses the Continental Divide and connects Estes Park with Grand Lake. About 32 miles of this road are within the park. The best method of approximating through travel over this road is to take the

sum of the inbound and outbound travel past the Grand Lake entrance. The travel count at this entrance is as follows:

	Total travel	
	Cars	Persons
Grand Lake entrance, inbound travel.....	12, 206	37, 822
Grand Lake entrance, outbound travel.	12, 597	40, 967
Total.....	24, 803	78, 789

CONSTRUCTION

ROADS

Construction is now in progress on the 17.2-mile project from Deer Ridge to Fall River Pass, which is to supersede the present eastern portion of the Fall River Road. This work is being done under a contract let late last season to W. A. Colt & Son, of Los Animas, Colo., under the direction of the Bureau of Public Roads. Five steam shovels are in use, and work is going forward from both ends of the project. Due to the abnormally mild weather, construction was carried on throughout the past winter. The work is approximately 40 per cent completed.

The west-side Fall River project of 10 miles, running from Fall River Pass to the Colorado River, has been advertised, and it is expected that the contract will be let and construction begun before the close of the present season.

TRAILS

Approximately 11 miles of trail have been completed during the season. The work was scattered over a number of routes in order to complete trails started last year while also starting three new and much-needed routes.

Last year's trail work was continued as follows:

North Longs Peak Trail, $1\frac{1}{2}$ miles, to a junction with the trail from the Hewes-Kirkwood Inn to the Boulder Field. This trail offers a direct route from Bear Lake to Longs Peak. Storm Pass Trail, one-fourth mile, to an intersection with the old trail making last year's construction serviceable. Thunder Lake Trail, three-fourths mile, to Thunder Lake, its objective until such time as it may be continued across the Continental Divide. North Inlet Trail, $1\frac{1}{4}$ miles, to the shelter cabin near timberline on Flattop Mountain. Further construction, continuing this trail across the Continental Divide to Bear Lake, will be postponed until a more adequate loop system is completed on the Grand Lake side.

The following new trails were started and completed as follows:

Glacier Creek Trail, 1 mile.—The portion between Glacier Gorge junction and Bear Lake is complete, and takes the horse travel off of the upper mile of the Bear Lake Road. Work is being pushed on the portion from Glacier Gorge junction to the northern end of the Storm Pass Trail, which, when completed next year, will free another three miles of the Bear Lake Road of horse travel.

Nymph Lake Trail, one-half mile.—It is planned to continue this trail to Dream Lake next year.

Fall River Trail, 2 miles.—This much-needed trail from Estes Park to Horse-shoe Park and Deer Ridge was completed from the Old Man ranger station of the Forest Service to a point on the Deer Mountain Trail, and work was started on the route to the Aspenglen camp ground.

Shadow Mountain Trail, $3\frac{1}{4}$ miles.—A good grade of fire trail was completed from the Pole Creek Road to the top of Shadow Mountain, where a fire-lookout building will be erected next year. It is already proving popular with park visitors.

Considerable complication arose by receiving only half of the trail allotment before July, as it necessitated the purchase of additional equipment well along in the season. Compressors, which had to be made in San Francisco, were not received until August. However, by concentrating all available forces on the

new work as the crews completed the earlier portions, it was possible to leave very few "blind ends." The question of maintenance is being given special attention on the new trails. A small crew has been out all summer resurfacing the work of last year, so that bogs and scour will not reach the proportions which they have in the older trails. Location of trails now under construction and those programmed for next season, as well as reconnaissances for the construction and relocation of the rest of the trail system in the years to follow were made by survey crews during the summer under the direction of Assistant Engineer Dunn, of the San Francisco office.

BUILDINGS

During the fall of 1929 an employee's cottage was built at the utility site and named Fir Cottage. This is the sixth cottage at this location. During the summer of 1930 a bunk house was built at the Milner Pass road camp on the Fall River Road, a shelter cabin was built at Thunder Lake, an addition was made to the storehouse at the utility site, and an information office begun on the administrative site.

MAINTENANCE

ROADS

There are about 60 miles of road in, and maintained by, the park exclusive of the Deer Ridge-Fall River Pass project now under construction. The Bear Lake Road which was completed last season and treated with oil has this season been given further oil treatment. The narrow bridge across Onahu Creek on the west side of the Fall River Road was replaced by a new log structure. Roadside clean-up work was done on the Bear Lake, West Side Fall River, and High-drive roads, and an effort made to heal and replant the old road scars.

TRAILS

There are about 185 miles of trail in the park. The necessary maintenance work to keep all trails open to horse traffic was carried on. Many of the old, substandard trails are not adequate for the present heavy travel and the cost of maintenance on them is high.

TELEPHONES

This park has approximately 95 miles of pole line, on which the usual maintenance work was done. About $3\frac{1}{2}$ miles of emergency line was built from the Grand Lake ranger station to the temporary Shadow Mountain fire lookout above Grand Lake.

SIGNS

During the year various new and replacement road, trail, and name signs were placed in the park for the convenience of the visitors.

PUBLIC UTILITIES

The public is served by the following operations:

Transportation by motor.—The Rocky Mountain Parks Transportation Co. operated busses on schedule from Denver, Longmont, Loveland, Lyons, Boulder, Fort Collins, and Greeley to Estes Park and Grand Lake, as well as over all roads in the national park.

Hotels, camps, and lodges.—The Rocky Mountain Lodges (Inc.) operated under lease from the Government Grand Lake Lodge, located near Grand Lake, and the Estes Park Chalets and the Stanley Hotels outside the park, near the village of Estes Park. A lodge at Bear Lake, which is reached by the new Bear Lake Road completed last year, and one at Fern Lake, which is reached by trail from Moraine Park, were operated by the Front Range Lodges (Inc.). F. D. Tecker operates Forest Inn at "The Pool" between Moraine Park and Fern Lake. At the Shelter Cabin on the Boulder Field Robert Collier, jr., provided meals and lodging to those who wished to climb Longs Peak in easy stages. About 45 hotels, camps, and lodges located on patented land in the park and vicinity were privately operated.

SADDLE HORSES

There is no concession for the operation of saddle liveryes. Horses are supplied by privately operated corrals. This means of enjoying the park increases in popularity from year to year, and at present it is estimated that there are some 1,500 horses in use in the park and immediate vicinity.

CAMPING

Of the five free public camp grounds maintained by the Park Service, two, Aspenglen and Glacier Basin, are in charge of caretakers. During the 1930 season 4,815 campers used the Aspenglen camp and 2,863 the Glacier Basin. The Longs Peak camp ground is located on the eastern slope of Longs Peak, at the end of the automobile road, and is used chiefly by those who climb the peak. Pineledge, located about 2½ miles from Estes Park, is used mostly by campers who prefer to be near the village. Endovalley, about 9 miles up the Fall River Road, is used largely by fishermen and campers on their way across the range. A number of large parties have utilized the camping facilities of the park during the season, the largest being the Highlander Boy Foundation, which uses Glacier Basin camp ground each June, with 600 to 800 boys in camp.

SNOW REMOVAL

Snow-removal work on the Fall River Road was begun May 1 and continued until June 15, when the road was officially opened for travel. Comparatively little snow-removal work was necessary west of the Continental Divide, and the big drift just east of Fall River Pass, which last year was 30 feet deep, was only 19 feet deep this year. Practically all the snow-removal work was done by steam shovel, as the snow conditions made it practicable to clear the road across Fall River Pass early enough to continue on down toward Milner Pass, a section that had in previous years been shoveled by hand. While last year this work cost more than in any previous year, this year the cost was only about half as much as usual.

INSECT CONTROL

Owing to an early spring, mosquito-control work in the vicinity of Grand Lake was begun on April 17. It was continued to July 1. Inasmuch as some of the area treated is outside the boundaries of the national park, the local residents contribute funds toward this work equal to the amount provided by the Government. This work greatly reduces the one undesirable feature of the Grand Lake district.

The infestation of Black Hills beetles has reached a harmless minimum in the park. Rangers cut and peeled 20 infested trees during the year. The Forest Service had crews working in regions adjacent to the park during May and early June.

EQUIPMENT

Two new model A Fords with pick-up bodies were purchased in June. Other equipment purchased includes 1 Cletrac grader and scarifier, 2 model AA Ford dump trucks, 1 model AA Ford 1½-ton truck with stake body. Two Rix portable air compressors, as well as tents and camp equipment were purchased for use in trail construction. Fire fighting equipment purchased includes hand tools for eight 6-man tool caches, one 50-man cache, and one 25-man cache. One new type N Pacific pumper was purchased for use in the park.

APPROACH ROADS

Last fall Elkhorn Avenue, the main street in Estes Park Village, was oil processed, which effected a considerable improvement in this street.

The Bear Lake Road between the Wind River junction and the park boundary was graded and straightened by Larimer County during the summer. Boulder and Larimer Counties widened and improved the curvature at several points on the North St. Vrain Road between Lyons and Estes Park.

The State highway department continued the grading and crushed-rock surfacing of the Grand Lake-Granby Road, which is the west approach to the park. This work is now about 80 per cent completed from Grand Lake to the junction with the Victory Highway (US40N).

FIRES AND FIRE PREVENTION

During the month of June a serious fire hazard was experienced. Eight fires occurred, but all were extinguished without causing much damage. Following June an unusually wet season developed and no fires occurred. Park rangers assisted Forest Service officials in combating three fires in the adjoining national forests during the year.

The Twin Sisters Mountain fire lookout was continued, and a new one on Shadow Mountain was established to serve the area west of the Continental Divide during the summer months. A patrol was inaugurated on the North Fork of the Thompson River to supply fire protection in the north end of the park.

FAUNA

Wild animals were seen in increasing numbers and were in good condition. Early in the season evidence of scabies was noted in several herds of mountain sheep, but this appears to have cleared up during the summer. Under protection there appears to be a definite tendency for the elk, sheep, and deer to remain in increasing numbers during the summer on the east side of the Divide and in the lowlands where they can be seen by the park visitors. There is no accurate count of the wild animals in the park, but numbers are estimated to be as follows: Black tail deer, 3,600; mountain sheep, 400; elk, 330. Bears, both black and brown, were seen quite frequently during the past year and it is evident that they are increasing rapidly. In December, 1929, a trap line was picked up in Forest Canyon and some 20 traps confiscated. Two fine marten which have been mounted for exhibition were taken from them. The poachers were not apprehended.

Fishing continues to be popular. Six hundred seventy-seven thousand five hundred fish were supplied by the Estes Park State Fish Hatchery and planted in local streams and lakes. These included 114,500 rainbow, 333,000 brook, and 230,000 native trout.

WEATHER

Extremes in weather conditions occurred in January and June, January being exceptionally cold and June exceptionally warm. In January the temperature went below zero 12 nights, reaching a minimum of -35° on the night of January 17. Snowfall for the winter was unusually light. In June the temperature reached 82° on the 28th and went above 75° on 14 days. The month was also very dry, there being 25 days perfectly clear, and with only 0.04 inch of rainfall for the entire month. This continued for the first week in July. After the first week in July the weather was rainy up to the middle of August.

LANDSCAPING

On April 24, 1,200 three-year old Western yellow pine trees were planted on the Aspenglen Public Camp Ground with the cooperation of various local organizations. It is hoped something of this nature may be done annually.

WINTER SPORTS

The annual winter outing of the Colorado Mountain Club was held at Grand Lake February 15 to 22, with 7 women and 18 men in attendance. The party reached Grand Lake by horse-drawn sled from the nearest railroad point 16 miles away, several members of the party skijoring the entire distance on the return. Accommodations for the party were had in the village of Grand Lake. The weather was mild and the snow, though plentiful, was sticky. Ski trips were made up the North Inlet, East Inlet, and Tonahutu Creek trails, as well as across the lake itself to the ski course on the lake shore. Skijoring with saddle ponies was done on the village street.

SEQUOIA NATIONAL PARK

JOHN R. WHITE, Superintendent, Sequoia National Park, Calif

THE PAST YEAR

This is my eleventh annual report as superintendent of the Sequoia National Park. The past year has been one of steady progress. At a time of national business depression and retrenchment, enhanced in the San Joaquin Valley by the stagnation of the raisin and fruit industry, this park, with 129,221 visitors, shows a travel increase of 16 per cent over last year. This is the more remarkable because Sequoia has never received the advertising that is incidental to a heavy operators' investment. It is a case of "Good wine needs no bush." We have been advertised by our satisfied visitors.

The heavy travel reached its peak on July 4, when 1,176 cars brought 4,256 visitors to Giant Forest. This is as many visitors in one day as entered in several months only a few years ago. The problem of handling such numbers in the congested central Big Tree area at Giant Forest is a serious one; and much study and planning must be given to developing new areas for hotels, housekeeping camps, public camps, etc., in order to accommodate the increasing crowds.

If we do not plan carefully and transfer the major part of the present activities away from the heart of Giant Forest, the beauties of that area will be irretrievably impaired.

Perhaps the principal matters of interest during 1929-30 were the extension of all-year travel and winter sports. On many days during the past winter, several hundred visitors enjoyed the Big Trees under boreal conditions.

Our trail and footpath construction program went ahead with a total of 18¾ miles built, which makes 43¾ miles of high-class trail constructed during the past three years. The horse trail to the summit of Mount Whitney, 14,496 feet, was finished during August and was dedicated on September 5.

The first serious accident during several years of trail construction occurred on August 26 on the John Muir Cut-off Trail at upper Tyndall Creek, when a rock slide following a blast seriously injured four of the trail crew, one of whom, Donald Downs, died several days later. Despite every effort of the park administration and the medical service, it was over 48 hours before Dr. Morton W. Fraser could make the long trip from Woodlake, via Mineral King, to the scene of accident. This was the third long saddle trip into the depths of the mountains during the past season for Doctor Fraser. Airplanes were also used to supply medicines to the improvised hospital at an elevation of nearly 11,000 feet and to carry the injured men from Independence on the Inyo side to the United States Compensation Hospital at Fresno.

The public operators had a generally successful year, and the Sequoia-Grant Parks Co. went ahead with minor improvements, the principal being additions to the Camp Kaweah housekeeping unit, enlargement of the Giant Forest Lodge office, and installation of a new unit known as the Pinewood Shelter Camp. The few complaints about accommodations or prices were quickly adjusted by General Manager Mauger, who has shown a fine spirit of working with the Park Service and a desire to please the public.

The Lindley Eddy Studio was opened at the new village and this permitted a complete clean-up and landscaping of the old village.

Probably the park has no greater need than additional planning and landscape work. It is difficult to handle the increasing crowds in the present Giant Forest area and consideration should be given to continuance of the policy of removing all overnight accommodations in the Giant Forest Lodge and public camps to a new site with ample room for the inevitable increase of travel. This may be safely predicted both by actual past experience in Sequoia and by the examples afforded in other parks, notably in the Yosemite. There is no room at Giant Forest for additional parking areas, the development of which under the sequoias will mean permanent injury to scenic values which it is our duty to preserve. Those of us in Sequoia Park who have long studied this problem would like to see the Giant Forest area reserved and developed for sightseeing and picnicking, and the lodge and camps transferred to Lodgepole Camp, Willow Meadow or other area which offers opportunity for the impending larger development. The transfer of our industrial

site from Giant Forest to Lodgepole Camp should be provided for in the 1933 appropriations.

The major improvements to be made this winter on the Generals' Highway between Hospital Rock and Giant Forest will stimulate travel; while the opening of the interpark road between Sequoia and General Grant within five years will pour an additional flood of visitors into the congested Giant Forest area. Having in view the examples of other parks, as well as our past experiences in Sequoia, we should not wait to divert the stream until the flood is upon us.

We should also develop our forest nursery and reforestation program so as to restore the areas which have been tarnished at Giant Forest and elsewhere.

With few major accidents, few court cases, and general pleasant relations with the public and with the operators, we look back upon a successful year's work, and look forward to further progress during 1930-31.

The death of our first director, Stephen T. Mather, was, of course, the principal event affecting the park; and it is difficult to realize that we shall not see him again beneath the Big Trees that he loved so well and to which he gave such large personal and financial contributions.

The following considers briefly the past year under the six departments of the park: Administration, protection, maintenance, construction, educational, and forestry.

ADMINISTRATION

This department under Assistant Superintendent D. J. Tobin contains a total of seven permanent employees and four temporary. The permanent force consists of 4 in the office, 2 in the telephone exchange, and 1 in the storehouse. Two temporary operators are employed in the summer to handle the Giant Forest telephone exchange, and a laborer and truck driver are employed to assist the storekeeper during the rush season.

Routine office business increased in all lines; purchases, vouchers, disbursements, stenographic work, compensation cases, accounting, publicity, filing, time-keeping, and other work were heavier than in previous years. Despite pressure it was possible to keep the office work up without special help during the heavy travel season. With the steady growth of the administrative work it is doubtful, however, if the present force can handle the next season's business. Only by adjustments in the telephone central operations, which it is hoped can be made when the new Giant Forest line is built this fall, will it be possible to relieve some of the pressure.

The storehouse was particularly busy throughout the year. While the conduct of the work, due to resignations, was in the hands of temporary employees for nearly nine months, there was no interruption to the orderly supplying of crews. The installation of a refrigerator room, approximately 7 by 9 by 9 feet, permitted the keeping of fresh products in stock where previously, due to a prevailing summer temperature of from 90° to 110°, it was necessary to buy from local dealers at retail prices from day to day as needed. I feel safe in saying that savings effected by wholesale purchasing of such perishables have, in just one season, entirely offset the cost of installation, \$1,300.

Summer telephone and telegraph business showed a substantial increase over 1929. The single telephone line from Giant Forest to the outside world has been very badly overloaded and great inconvenience to the Government operations and the general public has resulted. The construction this fall of the \$10,000 system authorized by Congress will correct the present bad conditions. The business from the Mineral King district is increasing, proportionately, even more rapidly than that of the Giant Forest district.

Revenues showed an increase of 8.8 per cent over 1929, reaching \$33,923.92, as compared with \$31,178.51. This is considered most satisfactory since cattle grazing was abolished during the year and the several hundred dollar fees from this source not collected. The increase in automobile travel is reflected, of course, in the revenues.

For administration, protection, and maintenance an appropriation of \$105,000 was available during the fiscal year 1930, and \$25,000 was provided for minor construction; for trail construction and minor road projects the sum of \$50,000 was granted; in all, a total of \$180,000. Of special interest as showing the value of Sequoia National Park to the neighboring communities is the figure of \$127,794.14 spent during the fiscal year in salaries and wages to employees. This does not include other heavy expenditures made locally for supplies and equipment.

The total number of all-year park employees was 29, and the maximum number of all classes of employees on duty at any time was 161. During the winter every effort was made to keep the organization down to the permanent employees, but the constant flow of visitors to enjoy winter sports made this practically impossible. Visitors enter the park every day of the year and there is now barely any period when we can catch up from the rush of the preceding summer flood or prepare for the coming summer.

PROTECTION DIVISION

The ranger force, under Chief Ranger Lawrence F. Cook, consists of 1 assistant chief ranger and 8 permanent rangers, with 6 temporary rangers for summer work.

Winter activities kept the ranger force extremely busy checking and regulating traffic, information service, supervising and maintaining winter sports activities (which have now taken a major place in the program of this park), frequent patrols throughout the park for the protection and observation of wild life, snow, and water surveys, repair and maintenance of trails and telephone lines, and other special assignments. Due to the maintenance of an open road to Giant Forest throughout the winter, the problems of handling the public, maintenance of winter sports activities, traffic control, etc., create a need for additional personnel to handle this increased use of the park, which is in addition to the usual winter activities.

Summer work consisted of checking and regulation of traffic and information service, fire and police protection, regular patrols throughout the park, maintenance of trails and telephone lines, conducting special parties, the posting of metal signs (the first permanent signs placed in this park), and fish planting. One permanent ranger was assigned to the educational division as ranger-naturalist during the summer.

The needs of the protection division are for an increase in both permanent and temporary personnel to handle the steadily increasing travel and growing winter activities. There is especially needed a year-round motor-cycle patrol.

Fire protection.—Three lookouts and three fire patrolmen were on duty throughout the fire season, which was one of the driest in the history of California. With the completion this season of two lookout houses, the park now has an efficient system for the detection of any fire that may start in the high hazard areas in or near the park, 85 per cent of the brush and forest areas of the park being under continuous, direct visibility.

Due to the great improvement in the efficiency of the State Protection Organization in this area, our greatest source of danger—fires outside the park assuming large proportions before reaching the boundary—is reduced. Two threatening fires occurred this season in the brush areas west of the park, but due to quick action by park and State forces, working in harmony, both were confined to comparatively small areas.

The greatest need for the future for the protection of the park forests are the opening up of the great areas of brush below the timber by means of low-standard roads and trails in order to permit quick transportation of men and equipment to any fire that may start.

MAINTENANCE AND CONSTRUCTION DIVISION

This division comprises all park maintenance, improvements, and repairs, as well as the construction of buildings and minor construction other than major road and trail construction, and is under the supervision of Hugh W. Parkes, general foreman. Under Mr. Parkes there are 8 permanent employees, and during the height of summer activity there were 37 temporary employees, or a total of 45.

The principal construction of the past year was a 5-room residence at Ash Mountain headquarters for the assistant superintendent, at a cost of \$3,299.84; an addition to the storehouse at Ash Mountain, \$1,896.52; a comfort station and bathhouse at Ash Mountain, \$1,305.55; and a sewer system and water system, together with minor enlargements of public camp grounds, and much landscaping and miscellaneous improvements.

Excellent work was done by the general foreman and all the permanent men in keeping Giant Forest open to winter travel. This involved much overtime work, which was cheerfully given, the whole organization using as a slogan, "Keep the roads open!"

The chief needs of this division are increases for road and telephone-line maintenance, for trail maintenance, and particularly for repairs to machinery and to buildings. Owing to lack of funds, it has been impossible to paint our trucks, tractors, and other machinery and keep them up to national-park standards. We are still using a number of World War trucks and are short of trucking and road machinery.

As an index of the volume of work handled by this division it should be noted that there are 11 heavy trucks, 2-ton or over; nine $\frac{3}{4}$ -ton to 1-ton trucks; and 12 light pick-up body trucks; as well as 3 tractors, 6 compressors, 4 pieces of road machinery, etc.

MAJOR ROAD CONSTRUCTION

During 1930 little progress was made on major road construction owing to the delay in letting contract for grading 2.70 additional miles of the Generals' Highway beyond Lodgepole Camp, but the contractor moved in during August and work began on the grading and also on the long-delayed bridges. At the end of this year's contract there will remain only about 6 miles of construction to the Sequoia Park boundary, and preliminary arrangements have been made for the Forest Service to program construction between the parks.

The new road to Lodgepole Camp was opened for travel for the first time in 1930 and has resulted in heavy travel to that pleasant area beside the Marble Fork River.

TRAVEL

Despite generally bad travel conditions, Sequoia showed the usual healthy increase of 16 per cent over 1929. Particularly noticeable was the increase in cars from other States, which are now 8.2 per cent of the total, as compared with 4.6 per cent in 1926, when figures of this nature were first compiled. There were no fatal accidents and very few minor ones.

TRAIL AND MINOR ROAD CONSTRUCTION

This division is in charge of Assistant Engineer Diehl, of field headquarters. The most important trail construction is the completion of the Mount Whitney Trail and that portion of the High Sierra Trail about 2 miles from Whitney Creek, connecting with the Mount Whitney Trail. This has made it possible to ride or walk to the top of Mount Whitney, the highest peak in the United States, 14,496 feet.

The end of the 1930 season will also find the High Sierra Trail completed from Crescent Meadow across Buck Canyon, through Bearpaw Meadow into River Valley territory, about 12 miles easterly from Crescent Meadow.

About 6 miles of secondary trail have been constructed connecting the two ends of the Paradise Creek-Atwell Trail, so that stock now have a direct route over the ridge from Hospital Rock to Mineral King. This is also an important trail for fire prevention.

A small crew has been able to make satisfactory progress on a trail rerouting the John Muir Trail over Forester's Pass, west of Junction Peak. If funds are available for construction in the national forest, this new route should be completed by the end of 1931 season. On the park side, between 5 and 6 miles of work will be necessary to make a first-class trail over the Kings-Kern Divide.

Nearly 4 miles of improved footpaths in the Giant Forest area were also built during 1930.

Of minor roads, about three-fourths of a mile of 16-foot graded road through the Lodgepole Camp area was built.

A summary of trails and roads constructed for the season follows:

- Mount Whitney Trail, 1 mile.
- High Sierra Trail (both ends), 7 miles.
- Paradise Creek-Atwell Trail, 6 miles.
- John Muir Trail cut-off, three-fourths mile.
- Giant Forest footpaths, 4 miles.
- Lodgepole Camp road, three-fourths mile.

Subject to appropriations, it is desired to start from the Kern River crossing of the High Sierra Trail above Junction Meadow, and not only complete the gap up Wallace Creek and connect with the end of this year's work on the west side of Mount Whitney but also to work west and relieve the condition east of Rock Slide Lake in the Kern Kaweah Valley. From River Valley it is

hoped that the High Sierra Trail can be completed up past Hamilton Lakes and through Kaweah Gap. This will make possible a diversion of travel down the Big Arroyo and should open up that area from the east at least three weeks earlier to travelers, as the gap is only 10,800 feet high or nearly 1,000 feet lower than existing Black Rock Pass route at 12,000 feet.

The John Muir Trail change should be completed and a short trail of about 2 miles should go over the hogback dividing Tyndall Creek and the upper Kern River Basin to South American Lakes area.

Consideration of a new trail from Big Arroyo to Chagoopa Plateau should not be overlooked, as well as necessary improvements on the Rattlesnake Creek and Funston Creek Trails.

A trail bridge across the Kern River somewhere in the vicinity of the present ford is an item of important consideration.

Moro Rock stairway and ramp will also receive the delayed attention and construction so urgently needed.

Moro Rock Road will be improved and continued on to a connection with the Crescent Meadow Road.

At Lodgepole Camp a bridge to cross the Marble Fork should be installed, as well as a camp road on the right side of the river.

Those interested in the development of the Kern River area should note that the major portion of our trail work is in that area.

EDUCATIONAL DIVISION

Park Naturalist Frank T. Been spent November in Berkeley at the Naturalist Conference, prepared lectures, completed the naturalist plan of administration, organized the park library, delivered eight radio talks, and spoke before three luncheon clubs.

The educational work during 1930 was helped by the loan of a ranger for ranger-naturalist duty. The naturalist personnel as a result consisted of three employees, the park naturalist, a ranger-naturalist, and museum custodian.

The following were acquired by donation: Two sets of lantern slides, two sets of mounted moths, 1 set of mounted butterflies, a group of Indian mortars and pestles, and an album of photographs with a Redwood burl stand.

The service to park visitors was increased over last year by the organization of a campers' campfire and by the introduction of an automobile caravan.

During the year the following visitors observed and studied the educational activities and contributed toward the educational work: Dr. Harold C. Bryant; Ansel F. Hall; Joseph Dixon; Dr. W. W. Atwood; Prof. R. H. Compton, of South Africa; Mr. F. F. Latta, authority on local Indians; James Gibson, Forest Service educational campaign; Alfred Joy, secretary of Mount Wilson Observatory; Dr. Spencer Atkinson, wild-life photographer; Dr. Daniel Engholm, butterfly collector; Joseph Barbieri, Indian arrowhead maker; M. P. Skinner, former Yellowstone Park naturalist; Dr. O. L. Brawer, San Jose State College.

Sequoia sections, about 9 feet in diameter, were sent to the New York Botanical Garden and to the Webb School at Claremont, Calif.

FORESTRY DIVISION

Under Acting Forester Frank T. Been, the Ash Mountain Nursery was considerably extended by the transplanting of 1 and 2 year old seed-bed stock and by preparing new beds, which were sowed with seeds from trees and shrubs native to the park, the seeds of which were gathered in the park. A 10-foot deerproof fence was built around the nursery.

Assistant Landscape Architect Sager supervised the planting around the superintendent's residence and Ash Mountain headquarters.

Bark-beetle control projects were conducted at Lodgepole Camp and at Paradise Creek.

Dr. F. C. Craighead, in charge of the division of forest insects of the Bureau of Entomology, visited the park to study insect conditions and to discuss with the superintendent the policy to be used in beetle control.

J. M. Miller, senior forest entomologist, made four visits to the park during the year to examine and advise concerning forest-insect conditions.

Two experts from the Bureau of Entomology spent three days in the park training park rangers in the detection and recognition of forest insects and methods of control. This work was conducted as a preparatory step in the event conditions warrant an extensive bark-beetle control campaign this fall.

TRAVEL STATISTICS

	1930		1929	
	Cars	Visitors	Cars	Visitors
Travel:				
By private auto.....	39, 631	124, 086	33, 252	107, 508
By stage.....		317		406
By other means.....		4, 818		3, 471
Total.....	39, 631	129, 221	33, 252	111, 385
Travel by entrances:				
Ash Mountain station.....	36, 205	115, 616	30, 063	98, 447
Mineral King Road.....	3, 426	8, 787	3, 189	9, 467
Trail entrances.....		4, 818		3, 471
Total.....	39, 631	129, 221	33, 252	111, 385
Winter travel, Oct. 1 to Mar. 31.....	6, 393	30, 208	4, 836	22, 616

Origin of travel (Ash Mountain entrance)	1930	1929	1928	1927	1926
	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
San Joaquin Valley.....	61. 0	63. 7	64. 0	62. 7	64. 6
Southern California.....	26. 0	22. 8	24. 2	28. 1	27. 8
Northern California.....	4. 8	5. 6	4. 2	4. 1	3. 6
Other States and foreign.....	8. 2	7. 9	7. 6	5. 1	4. 6

	1930	1929
Number of visitors using camp grounds.....	32, 197	21, 266
Number of public camp grounds.....	15	15
Name and number of camp sites in each:		
Sunset camp.....	30	
Paradise camp.....	50	
Moro Creek camp.....	3	
Soldier camp.....	10	
Sherman Tree camp.....	20	
Hospital Rock camp.....	25	
Knob Hill camp.....	20	
Atwell Mill camp.....	25	
Sunset Rock camp.....	35	
Firwood camp.....	50	
Bridge camp.....	24	
Old Commissary camp.....	20	
Lodgepole camp.....	75	
Potwisha camp.....	25	
Hazelwood camp.....	60	
Total.....	472	
Roads, number of miles.....	69	40¾
Telephone lines, number of miles.....	130	128
Trails, number of miles.....	615¾	597

Wild life	Condition	1930	1929
Bears, California black.....	Good.....	172	250
Deer, California mule.....	do.....	5, 200	6, 000
Fisher.....	do.....	180	500
Marten.....	do.....	200	1, 000
Mink.....	do.....	200	200
Foxes.....	do.....	360	350
Gray squirrel.....	do.....	150	200
Bobcats.....	do.....	90	150
Coyotes.....	do.....	400	1, 000
Mountain lions.....	do.....	34	44
Wolverine.....	do.....	6	4
Mountain beaver.....	do.....	2	
Grouse.....	do.....	500	3, 000
Quail.....	do.....	10, 000	8, 500
California condors.....	do.....	0	4
Golden eagles.....	do.....	18	12
Bald eagles.....	do.....	2	2
Green herons.....	do.....	8	6
Blue herons.....	do.....	4	
Wild pigeons.....	do.....	200	200
Horned owls.....	do.....		10

TRAVEL STATISTICS—Continued

	1930	1929
Revenues:		
All sources, fiscal year.....	\$33,923.92	\$31,178.51
Auto licenses, travel year.....	\$21,399.00	\$18,399.00
Appropriations:		
General.....	\$105,000.00	\$95,040.00
New construction.....	\$25,000.00	\$17,000.00
Roads and trails (operating season), cash.....	\$215,900.00	\$50,000.00
Court cases before United States commissioner:		
Total cases.....	11	9
Convictions.....	11	9
Total fines imposed.....	\$205	\$295
Grazing:		
Number of cattle.....	None.	1,100
Number of permittees.....	do.....	8
Areas occupied, acres.....	do.....	47,480
Fish planted.....	155,000	150,000
Library books circulated.....	3,071	3,125
Fires:		
Total number inside park.....	12	8
Acres burned.....	5.4	1.1
Number of fires reported outside park.....	38	66
Cooperative work on fires outside park.....	13	23

Month (public operators, Sequoia- Grant Parks Co.)	Number of arrivals					
	1930			1929		
	Lodge	Kaweah	G.R.& P.	Lodge	Kaweah	G.R.& P. ³
May.....	390	256	81	350	179	-----
June.....	1,183	429	694	1,111	901	-----
July.....	1,089	681	1,513	1,237	1,190	-----
August.....	991	920	1,671	1,234	1,278	-----
September.....	474	317	444	549	633	-----
Totals.....	4,127	2,603	4,403	4,481	4,181	-----
Stage passengers, one way.....	434			687		
Giant Forest winter camp (arrivals).....	1,195			489		

¹ 2,254 acres.² 10.1 acres.³ Glen Ridge and Pinewood Shelter camp.

SULLYS HILL NATIONAL PARK

O. C. GRAY, Acting Superintendent, Fort Totten, N. Dak.

The number of visitors coming to the Sullys Hill National Park and Game Preserve on Sundays and holidays during the past season was not so large as last year. This was due to the fact that work was not so plentiful as it has been in the past and consequently there was less money to spend for outings. On the other hand, more visitors came in on week days than during past years, also probably due to less work generally. The park was open every day during the summer. At other seasons of the year it opened upon request and oftentimes when weather conditions were favorable.

Visitors for the season October 1, 1929, to September 30, 1930

	Cars	Visitors		Cars	Visitors
October, 1929.....	171	841	July.....	1,453	6,708
November, 1929, to Mar. 31, 1930..	22	78	August.....	851	3,995
April, 1930.....	53	466	September.....	271	1,957
May.....	371	2,266	Total for the season.....	4,284	21,293
June.....	1,092	4,982			

The drives about the picnic grounds were widened and graveled in several places during the year. Rocks were removed from the roadway and the road widened and leveled by grading leading from the picnic grounds to within 100 feet of the top of Sullys Hill. The west shelter building was painted as well as the ladies' rest room, protector's quarters, and barn and shop buildings. The elk and buffalo corral for capturing and loading surplus animals to be shipped was rebuilt out of oak poles and cedar posts and enlarged. A holding pen was also constructed. Twenty acres of lake-bottom land was cleaned of weeds and brush in order that it might be used for hay, of which over 50 tons were put up and hauled to the preserve for winter feed for the animals.

The animals are all doing well. There are 13 buffalo, 2 being this year's calves. There are 22 elk a year old or over, and it is estimated that 8 elk calves were born this year. There are 5 white-tail deer, 20 antelope, 29 Canadian geese, and many ducks. Two of the female antelope had twin fawns this spring and created considerable interest among the visitors.

Plenty of rain fell in this region until July 20, but since that time little moisture has been received and it is very dry now. Extra caution has been required to see that no fires were started which would do damage to the timber and undergrowth, which is of rare beauty in this prairie region.

The Biological Survey maintains a reservation protector, Wesley D. Parker, through whom the funds for the park are spent for development and protection of the game. Mr. Parker personally conducts trips into the pasture and to Sullys Hill for visitors on Sundays and holidays or whenever any number of visitors desire to make the trip. Because of this fact the near-by city of Devils Lake has become a most important State convention meeting place of various organizations. During these trips the buffalo are quite often in sight along the roadways, giving many people their first view of these animals. Visitors also get much pleasure out of seeing the antelope but seldom catch sight of elk, which inhabit the dense timber away from the paths and roads. The young and old have great sport feeding the geese and ducks that come near the tables to have food tossed to them and often can be induced to take something from the hands of the children.

The last session of Congress took up the matter of turning the area over to the Department of Agriculture for use entirely as a game preserve. Final action was not taken on the measure.

WIND CAVE NATIONAL PARK

ANTON J. SNYDER, Superintendent, Hot Springs, S. Dak.

GENERAL STATEMENT

This year Wind Cave entered upon its twenty-seventh year as a national park, and during the 12 months that have passed it has received more in the way of material development and improvement than in all the previous years of its parkhood put together. The only actual construction carried on during the year was the improving and surfacing of the park road, but the 1931 Interior Department appropriation act made nearly \$40,000 available for other construction on water and sewer systems, electric lights for the cave, and a rangers' dormitory. This work will be started early in the fall with a view to having it all completed before the next visiting season.

As I write this report, and naturally look back over the five years that I have been at the park, I can not help but feel elated at the mighty fine recognition that has been given Wind Cave by our visitors. Many who have traveled far and wide and who have had the privilege of seeing other great caverns, pronounce Wind Cave the best cave they have ever visited. Even the most prosaic visitor is highly impressed with its beauty. The past season has been particularly gratifying in the number of enthusiastic visitors.

TRIPS

Beginning October 1 and continuing until April 30 only one trip a day, at 2 p. m., is made in the cave. On May 1 a trip at 9 a. m. is added, and for July and August only trips at 10.15 a. m., 3.15 p. m., and 7 p. m. are scheduled in addition to the 9 a. m. and 2 p. m. trips. Each party entering the cave must be accompanied by park rangers or authorized Government guides. The fee for

this guide service is 50 cents per person. On July 17, 1930, First Assistant Secretary of the Interior Joseph M. Dixon approved an amendment to the park rules and regulations permitting children 16 years of age or under to enter the cave free when accompanied by parent or guardian.

WIND CAVE LUNCH ROOM

Mr. and Mrs. C. C. Gideon, operators of the State Game Lodge in the Custer State Park, were granted a permit this year for the operation of a store and lunch room at the park, succeeding Mrs. E. A. Fuson, who has discontinued her operations. The Gideons have erected a temporary building, pending approved plans for a more permanent and elaborate layout within the next few years. The lunch room was formally opened on June 10 and has proven to be very popular with park visitors. This season is the first time for many years that meals have been available at the cave.

APPROPRIATIONS AND REVENUES

The park appropriation of \$13,295 for the 1930 fiscal year contained no construction items and was inadequate for efficient administration and operation. By maintaining rigid economy, however, the more necessary maintenance features were taken care of and fairly ample guide service provided in the cave. Park revenues for the 1930 fiscal year were \$14,864.84, of which \$14,445.50 was derived from cave entrance fees, \$394.34 from grazing cattle, and \$25 from business concessions.

WEATHER

This year has been abnormally dry with unusually high temperatures during the summer months. As a result of the dry weather, local crop conditions are none too favorable, small grains being almost a complete failure in some sections. The winter months, with the exception of January, which was one of the coldest ever experienced in the Black Hills, were very mild and pleasant. Neither the park road nor its approach roads were impassable at any time during the year, and the summer on the whole was ideal for automobile touring.

THE GAME PRESERVE

The Wind Cave Game Preserve, operated in the park by the Bureau of Biological Survey, Department of Agriculture, has shown a very satisfactory progressive growth since its creation in 1912. There are approximately 100 head of buffalo, 80 elk, and 30 antelope in the preserve. These animals are confined in two spacious pastures of 3,400 and 3,600 acres, respectively, much of the woven-wire fences inclosing the pastures being located near the road so that park visitors have an opportunity to see the animals. One of the most important of the proposed improvements to the game preserve from a park point of view is the building of exhibition pastures, which will give the visitors to the park a much better opportunity to see and study the animals.

VISITORS

Due to the lack of proper camping facilities and cabin camps at the park nearly all of our visitors are forced to leave the park as soon as they have completed the two or three hour trip in the cave. This not only places somewhat of an inhibition on travel but also lessens the opportunities for a number of important contacts as well. The travel year has shown a decrease in visitors, due, I believe, entirely to the generally unsettled economic conditions throughout the country. The total number of visitors to the cave this season was 23,639 as compared with 29,265 visitors in 1929.

RECOMMENDATIONS AND CONCLUSIONS

With our fundamental necessities of water and sewer system, a good park road, and electric light-system taken care of during the present fiscal year, we should turn our attention toward the establishing of a headquarters area that will be a credit to the Government, and that will provide the necessary facilities for both the comfort and welfare of the visitors and the efficient administration

and operation of the park. The landscape division has made quite a comprehensive study of our problem and is working on a general layout plan which should be carried out as expeditiously as possible. The following buildings are urgently needed and their early construction is strongly recommended.

1. New public building to supersede the old unsightly frame building in which visitors to the cave are now being registered.

2. Two new resident buildings to provide quarters for increased personnel.

3. A rangers' dormitory and mess hall. At present temporary rangers are quartered in tents.

4. A general-utility building, combining machine storage, workshop, and warehouse facilities.

The following other recommendations are respectfully made:

1. Better facilities for enforcing the park's rules and regulations. Speeding on the park road, disorderly conduct in the park, and the injuring of crystal deposits in the cave are quite frequent. The awkward process of prosecuting such offenders in Federal court is costly to the Government.

2. Improvement of grounds at park headquarters by neat-looking lawns, the planting of suitable shrubs and trees, and the elimination of all unsightly buildings and fences.

3. A modern auto camp and camp ground, the former to be provided by the park operator and the latter by the Government.

4. Extension and improvement of the park operators' facilities and utilities.

5. The addition of a permanent clerk to the park's personnel, and the providing of annual appropriations ample for efficient administration, protection, and maintenance of the park.

In concluding this report I want to express my appreciation of the mighty fine cooperation we have had from the Washington office and from the landscape and the engineering divisions. I am very grateful for so much consideration and courtesy, and I anticipate with keen enthusiasm the productive future that so pleasant and agreeable relationships are almost sure to bring.

YELLOWSTONE NATIONAL PARK

ROGER W. TOLL, Superintendent, Yellowstone National Park, Wyo.

GENERAL

An unsettled state of affairs throughout the country had its effect on the travel and business in Yellowstone National Park during the summer season. The park operators found it necessary to retrench considerably, as the expected business failed to materialize. The reduction in rail travel was larger than in private automobile travel.

The superintendent spent part of the winter on the investigation of proposed national parks, including inspection of the Willamette Mountains in Oregon and the Everglades in Florida. He returned to Yellowstone early in April for the operating season. On March 31, 1930, M. F. Daum resigned as assistant superintendent to accept the managership for the Teton Lodge Co., to be in charge of their operations at Moran, Wyo. He was succeeded by Guy D. Edwards, transferred from the San Francisco office of the National Park Service. During the year the position of chief clerk was established, and B. A. Hundley, chief clerk of Glacier National Park, was transferred and assumed his new duties on October 27, 1929.

Instead of following average conditions, the weather during the year seemed to tend toward extremes. The fall season last year was very mild, and it was well into November before the main roads were blocked, making it necessary to discontinue auto travel. Very little cold weather was experienced until January, but that month was exceedingly cold. The spring broke early, and the roads were passable much sooner than usual. A rotary snowplow was used for the first time to aid in getting the roads cleared of snow. Park visitors were admitted at the north and west gates on May 15, although the roads were passable somewhat earlier. The forepart of the travel season was exceedingly dry but continued rains in August resulted in washouts and slides which considerably hindered travel and slowed up the construction work on the park highways. The heavy rains were general throughout the adjoining States, and many roads suffered. Part of the decrease in travel during August was due to weather and road conditions.

When the travel season closed our records showed a decrease of 32,796 visitors under last year, or 12 per cent. This is the first decline in travel since 1918, the last year of the World War.

Through agreement with the various railroads serving the park, the holding of ceremonies marking the opening of the season was discontinued. However, Mrs. John F. Sippel, national president of the General Federation of Women's Clubs, was entering the park via the north gate on June 18 with the first rail visitors for the season, the Northern Pacific Railroad arranged for the taking of sound motion pictures to be used as a publicity medium. Mrs. Sippel and her party were met at the train, placed in one of the old coaches used in preauto days in the park, and taken through the entrance arch, escorted by mounted rangers. The party then boarded one of the regular park busses and proceeded to Mammoth, where they were welcomed by the superintendent. Mrs. Sippel responded with a short talk on American Womanhood and the National Parks.

The park roads showed a considerable improvement over former years, and with increasing funds available for reconstruction of roads a gradual improvement of the road system will take place. The heavy rains of late July and August seriously hampered road construction and made travel on some stretches difficult, but the park roads did not suffer as much as some of the approach roads. The continuation of the oiling program added greatly to the comfort of visitors, and there was favorable comment on the improved manner in which the oil was applied. The dry weather during June and July made the display of wild flowers less conspicuous than usual. The natural forage on the winter range of the elk, deer, antelope, and buffalo was so damaged by the drought that the outlook for the wild life is unfavorable. A severe winter might cause a disastrous condition. A number of fires occurred during July, but all were extinguished before much damage was done. The largest covered 60 acres.

A general reduction in the price of gasoline and oil met with immediate favor of park visitors. The gas and oil prices were reduced to rates comparable to those in the immediate vicinity of the park.

On July 4 a spruce tree, about 10 feet in height, was planted on the lawn between the administration building and the Mammoth Hotel in honor of the late Hon. Stephen T. Mather, former director of the National Park Service.

Many visitors reported having seen park animals during their stay. Bears were abundant, and numerous complaints were received regarding property damage and personal injuries inflicted by them. The bear problem is increasing and changes will have to be made in order to improve conditions. Fishing was excellent most of the summer except when the heavy rains washed down mud into some of the streams, and the sport afforded a great deal of amusement and recreation to the thousands of visitors.

Director Albright made two visits to the park during the year, one from July 25 to August 4 and the other at the end of September. On the last visit he accompanied Senator Peter Norbeck, of South Dakota, a member of the Senate Special Committee on Wild Life Resources.

Many prominent persons visited the park during the summer, including the Assistant Secretary of the Interior, Hon. John H. Edwards; four United States Senators, Hon. Wesley L. Jones, of Washington; Frederic C. Walcott, of Connecticut; Peter Norbeck, of South Dakota; and Key Pittman, of Nevada; five United States Representatives, Mrs. Ruth Bryan Owen, of Florida; Don B. Colton, of Utah; Albert Johnson, of Washington; John W. Summers, of Washington; and Vincent Carter, of Wyoming; two governors, Hon. A. J. Weaver, of Nebraska, and Hon. Frank C. Emerson, of Wyoming; John D. Rockefeller, jr.; O. L. Bodenhamer, national commander of the American Legion; Mrs. John F. Sippel, national president of the General Federation of Women's Clubs, and William H. Jackson, pioneer photographer, who first visited Yellowstone with the 1871 Hayden survey party.

The Senate Special Committee on Wild Life Resources, consisting of United States Senators Frederic C. Walcott, Key Pittman, and Peter Norbeck; Morris Legendre, secretary; and C. D. Shoemaker, special investigator, held meetings in and inspected the Jackson Hole country with a view to determining the future of the Jackson Hole elk herd. Senator Norbeck visited the Yellowstone after leaving the Jackson Hole, while the others visited it en route thereto. With the committee were the Chief of the Biological Survey, the assistant forester of the Forest Service, George D. Pratt, president of the American Forestry Association, and the Director of the National Park Service.

TRAVEL IN 1930

Park visitors this year totaled 227,901, as compared with 260,697 last year, a decrease of 32,796. The rail-travel figures were 26,845, as compared with 38,979 last year, a decrease of 12,134. A comparison of rail figures of this season and last year are as follows:

Gateway	1929	1930	Loss
North.....	12, 243	9, 209	3, 034
West.....	19, 213	12, 961	6, 252
East.....	7, 233	4, 585	2, 648
South.....	290	90	200
Total.....	38, 979	26, 845	12, 134

¹ Rail travel accredited to the west entrance during the tourist season of 1930 consisted of 10,271 persons via the Oregon Short Line Railway (Union Pacific system), 1,637 via the C., M., St. P. & P. (Gallatin Gateway terminal of the Milwaukee), and 383 persons from the Bozeman terminal of the Northern Pacific plus 670 temporary employees of the Government and park operators.

Automobile visitors by entrance gateways as compared with last year are as follows (this travel is exclusive of motor cycle and preseason auto visitors) :

Gateway	1929	1930	Loss
North.....	39, 198	36, 930	2, 268
West.....	76, 897	71, 565	5, 332
East.....	73, 732	64, 825	8, 907
South.....	24, 758	21, 451	3, 307
Total.....	214, 585	194, 771	19, 814

The number of cars and visitors reported at developed public camp grounds during the season of 1930 are as follows:

Designated developed camp grounds	Cars	Campers
Fishing bridge.....	11, 454	36, 192
Old Faithful.....	10, 609	33, 521
Mammoth.....	6, 320	19, 971
Lake.....	1, 074	3, 341
Canyon.....	2, 851	9, 000
West Thumb.....	2, 336	7, 331
Norris Junction.....	582	1, 821
Madison Junction.....	955	3, 000
Tower Falls.....	1, 302	4, 111
Total.....	37, 483	118, 447
Approximate number of cars and campers using undeveloped camp sites.....	3, 500	11, 000

Total season travel by entrance gateways 1930 and 1929

Gateway	Visitors by rail	By automobile		By motor cycle		Miscel- laneous (walking, horse- back, etc.)	Presea- son visi- tors	Total visitor
		Cars	Visitors	Cars	Visitors			
1930								
North.....	9, 209	13, 419	36, 930	25	36	206	3, 618	49, 9
West.....	12, 961	22, 478	71, 565	64	87	341	1, 464	86, 4
East.....	4, 585	20, 746	64, 825	70	103	203	0	69, 7
South.....	90	6, 765	21, 451	21	29	137	61	21, 7
Total.....	26, 845	63, 408	194, 771	180	255	887	5, 143	227, 9
1929								
North.....	12, 243	13, 881	39, 198	40	50	484	3, 726	55, 2
West.....	19, 213	23, 696	76, 897	40	44	271	603	97, 0
East.....	7, 233	23, 061	73, 732	78	96	244	-----	81, 3
South.....	290	7, 777	24, 758	23	28	1, 479	108	26, 6
Total.....	38, 979	68, 415	214, 585	181	218	2, 478	4, 437	260, 6

WEATHER

August, 1929, the closing month of the last annual report, was warmer than normal. Monthly mean temperatures from August on alternated regularly above and below normal until June, 1930, which, like May, was below normal. July was above normal, and the first three weeks of August showed an average nearly normal. January, with a mean of 4.8° , was the coldest month in the records of the Mammoth station, while February, with 27.6° , equaled the warmest February. April was with one exception the warmest month of that name on record at Mammoth. December was warmer than November and March was colder than February. The year's highest temperature at Mammoth was 88° on July 8; the lowest, -34° on January 17. On the latter date Buffalo Ranch reported a minimum of -50° ; Gallatin, -46° ; Yellowstone Lake, -49° ; and Riverside, -57° .

Each month from and including September on was below normal in precipitation excepting December and August. Precipitation recorded in August before the month was half over exceeded the total for any full August in the record. The greatest annual snowfall was at Snake River, the least at Buffalo Ranch; the total at Mammoth, 72 inches, was 25 or 26 inches less than normal.

ADMINISTRATION

Headquarters office.—The regular personnel consists of Roger W. Toll, superintendent; Guy D. Edwards, assistant superintendent; Joseph Joffe, assistant to the superintendent; Chief Clerk Benjamin A. Hundley; Leroy Hill, disbursing clerk; Thomas Hickman, senior clerk and bookkeeper; Anna E. Greer, files and personnel clerk; Margaret Sabin, clerk stenographer; and Virginia Goettlich, timekeeper. This force is augmented during the summer season with 2 clerk-stenographers, 2 statistical clerks, 1 publicity clerk, and 1 card clerk. In addition, one new clerk position was created to take care of the stenographic and clerical work in the chief ranger's office. The maximum number of employees on the pay roll at one time was approximately 460 on a per diem basis and the maximum number of appointed personnel was 145.

ENGINEERING DEPARTMENT

This department is in charge of Resident Engineer Cecil A. Lord. The park road system consists of 305 miles of road. In addition the park force maintained 28 miles of the East Entrance Road in the Shoshone National Forest and 32 miles of the south entrance in the Teton National Forest. Approximately 170 miles are oiled. Of this about 120 miles are light oiled for dust prevention and 50 miles are semiprocessed. This latter work was started on July 13 and consists of a semiprocessing of all roads with a suitable natural surface material in place of the former dust palliative method. Valuable assistance on this work was given us by the engineering department of field headquarters.

Roadside clean-up.—Fourteen miles of roadside clean-up were done by donated funds and 14 miles by project funds. At present 92 miles of roadside clean-up are maintained from our regular maintenance funds.

The Park Service forces rebuilt 6.5 miles of the Mammoth-Norris Road. One and one-half miles of this amount was from the Mammoth Lodge to the terraces. The other section was from Obsidian Cliff south 5 miles. In addition 2 miles of road were rebuilt at the Paintpots section on the Madison-Old Faithful Road.

The park forces also built one-half mile of paved trail at Mammoth and plan the construction of 1 mile of paved trail at Old Faithful. In addition parking areas at Old Faithful were developed. Plans were made and construction started on the rebuilding of a new intake and the replacing of 2 miles of pipe line on Mammoth water system. The following major road contracts were let during the past year, all handled by the Bureau of Public Roads:

Projects 1-9-1, Canyon Junction-Tower Junction, 15.28 miles; 9-B, Artist Point, 1.6 miles; 1-B-2 and 1-B-3, Norris Junction-Madison Junction, 8.97 miles. The road project let last year from the east entrance to Lake Butte made steady progress, and the grading will be practically completed this fall.

ELECTRICAL AND TELEPHONE DEPARTMENT

This department is in charge of Chief Electrician Charles D. Dale and includes three permanent power-plant operators and one permanent telephone operator.

The following table shows total production of power plant at Mammoth and the distribution of current:

	1928-29	1929-30
Sold to park operators.....	89,415	78,392
Street lighting.....	29,500	30,344
Used by Government buildings for power and lights.....	647,795	689,356
Total production in kilowatt-hours at Mammoth.....	766,710	798,092

Fifty-eight miles of telephone line were rebuilt during the past year, using native poles and metallic circuit. The usual electrical and telephone maintenance work was carried out. We maintain 526 miles of circuit and 160 telephones.

BUILDING MAINTENANCE AND CONSTRUCTION

All carpenter work is under the supervision of Master Carpenter T. A. Bowman. All painting is under the supervision of Master Painter L. N. Tompkins.

Two snowshoe cabins, 3 bunk houses, 3 mess houses, 3 barns, 2 ranger stations, 1 fire lookout, and 1 log comfort station were constructed by the department during the past year. The regular building maintenance was carried on throughout the park.

MECHANICAL DEPARTMENT

This department is in charge of Master Mechanic Robert R. Robinson, and includes 6 permanent mechanics, 1 permanent blacksmith, 2 temporary mechanics, and 2 temporary blacksmiths.

New equipment and passenger-carrying vehicles purchased during the year included the following: 1 tractor, 4 motor patrol graders, three 3-ton trucks, four 1½-ton trucks, 4 small Ford trucks, and 1 passenger car.

SANITATION DEPARTMENT

This work is carried on under the supervision of H. B. Hommon, of the United States Public Health Service, and under the direct charge of William W. Wiggins. Mr. Hommon made a thorough inspection of our entire operations in June and outlined necessary corrective measures. Mr. Wiggins makes weekly sanitary inspection as outlined by Mr. Hommon.

The construction work this year consisted of the following: Completing the Norris water system, including the excavating and laying of 10,500 feet of 3-inch water pipe and 3,000 feet of 2-inch water pipe; building one comfort station at Norris; construction of sewage-disposal plant at Norris; incinerator at Fishing Bridge; construction of complete water and sewer system and comfort station at Appollinaris Springs; commencement of work of replacing miles of old water line at Mammoth by 24-inch line and the construction of a new intake.

In addition to the construction work, 9 water systems, 13 sewer systems and 3 incinerators at various places in the park were operated and maintained by this department. The heating systems at Mammoth, which include nine steam boilers, were also operated and maintained by this department.

LANDSCAPE DIVISION

Architectural and landscape work was supervised by K. C. McCarter, assistant landscape architect in residence during the construction period, and by Thomas C. Vint, chief landscape architect, during several general inspection trips. One of the accomplishments of this year was the development of a plan for the

Mammoth housekeeping area by Gilmore D. Clarke, landscape architect for the Westchester County Park Commission of New York, after a thorough study of the problems on the ground.

PROTECTION DEPARTMENT

Personnel.—George F. Baggley, chief ranger, 4 assistants to chief ranger, 26 permanent rangers; 43 temporary rangers (employed for the summer season, approximately 90 days).

Winter activities.—These were mainly regular and special patrols for the observation and protection of wild animal life; hunting predatory animals; observation of weather conditions; reporting water gage heights and snow depths; repair and maintenance of telephone lines, buildings and other equipment; wild-animal feeding; and care and feeding of Park Service horses at their winter feed grounds.

Summer activities.—Rangers were busy checking entrance and exit travel; regulating traffic; dispensing information; conducting parties; delivering lectures; compiling reports; maintaining and repairing trails, snowshoe cabins, ranger stations, and other improvements; and making patrols for forest fires and other regular and special patrols for the protection of the natural features of the park.

Forest fires.—The season of fire hazards began a month earlier than last year. Several small roadside fires were extinguished and several fair-sized fires in the interior of the park were discovered and suppressed before much damage had been done. The total number of fires was 28 and the total area burned was 110 acres.

Trail construction, maintenance, and improvements.—New construction consisted of $1\frac{1}{2}$ miles of trail to the Monument Geyser Basin; 9 miles of trail on Amphitheatre Creek to connect with the Cache Creek Trail; 1 mile of trail at Tower Falls; a new platform and walk at Kepler Cascades; new view platform at Tower Falls; new guard rail at Canyon; and several hundred feet of guard rail at various dangerous points in the park.

BUFFALO RANCH ACTIVITIES

Work consisted mainly of care and keep of herd, repair and maintenance of equipment, irrigation, and cultivation of hay fields. At this ranch 150 tons of hay were harvested this year, as compared with 500 tons last year and 945 tons in 1928. There are 170 tons of hay left over from last year. Seven hundred and fifty buffalo were fed 520 tons of hay during the winter.

HAY RANCH OPERATIONS

Wild game and horse feeding at the Slough Creek, Yancey, and Gardiner Ranches consumed 555 tons of hay, as compared with 302 tons last year. There are on hand 272 tons in addition to this year's harvest of 240 tons. Other ranch activities have been the repair and maintenance of equipment and buildings. Two hundred and fifty tons of hay will be cut by contract on the Pelican Meadows near Yellowstone Lake. At all ranches a total of 640 tons of hay will be harvested this year. A total of 1,075 tons of hay was fed to game during the winter.

PREDATORY ANIMALS

One hundred and thirty-five coyotes were killed during the past year, as compared with 288 in 1929 and 284 in 1928.

WILD LIFE OF THE PARK

Wild-life conditions as observed and reported by park rangers throughout the year are summarized in the following table. Conditions generally have been somewhat better than the previous year.

Wild animal count for year of 1930

	Actual count		Esti- mated, 1930	Increase	Condi- tion	Known losses
	1929	1930				
Antelope.....	638	510	650	Yes.....	Fair.....	Predatory 5; unusual 1; winter kill 5; man 1.
Buffalo, mountain.....		27	35	Possible.....	do.....	
Buffalo, Lamar herd.....	1, 105	¹ 1, 097	1, 097	Yes.....	Good.....	Drowned 1; shipping 5; winter kill 5; round-up 3.
Mountain sheep.....	120	125	150	do.....	Fair.....	Accident 1.
Moose.....	675	198	700	do.....	Good.....	
Elk.....	² 13, 258	9, 380	³ 10, 600	No.....	Fair.....	Predatory 4; accident 4; winter kill 61; man 1.
Deer.....	835	778	800	do.....	do.....	Predatory 14; accident 6; disease 63; man 4.

¹ This count is not a decrease, as 77 were shipped and 46 were slaughtered.

² This count has had a 10 per cent addition.

³ Report of losses covers the entire winter. One hundred and ten were shipped to zoos and public parks.

Bears, black and brown.—The bear count last year was 440 as compared with 490 this year. Large numbers are reported at Old Faithful, Canyon, Lake Thumb, and Mammoth. The bear situation this summer has become a problem. These animals have done a great deal of damage to tents and automobiles and in many cases have injured people. A total of 75 bear bites and scratches has been reported. Three bears have been killed because of their depredations and injuries to tourists.

Bears, grizzlies.—Grizzly bears are on the increase and this year the total is estimated at 167, as compared with 150 last year. They are numerous at all feeding grounds and in excellent condition, due to the abundant food supply. No injuries were caused by grizzlies this year.

Beaver.—There is no doubt that beaver are increasing very rapidly. A great many aspen and willow groves throughout the park have been entirely cleaned out by this busy little animal. Their food supply is decreasing at some points but as it becomes exhausted at one point they migrate to another place and start new construction work.

Trees and insects.—An aerial survey made by the Bureau of Entomology during July disclosed that no serious outbreak of forest insects has occurred during the past year. In July the camp grounds at Mammoth were sprayed with a solution of volck and nicotine sulphate for the control of aphides, and a marked improvement is shown by these trees. A few insect-infested trees at Old Faithful, West Thumb, and various other points were cut and destroyed.

A mapping project was started this spring for the purpose of locating and identifying all insect infestations or tree diseases, and accurately mapping these areas. The part to be mapped this year is the southwest corner of the park from the West Yellowstone-Old Faithful Road, south and west.

Waterfowl.—Ducks, geese, and other birds were observed in the usual number through the past summer and fall. The pelicans on Yellowstone Lake show an estimated increase of 75. Estimates show a total of 339 pelicans on the lake. We are cooperating with the Bureau of Biological Survey in securing their waterfowl census.

Fish planting.—Fish planting has been carried on under the supervision of the Bureau of Fisheries, as follows:

Eggs taken	15, 389, 000
Eggs shipped:	
Bureau of Fisheries account.....	7, 117, 000
Glacier National Park.....	500, 000
Grand Canyon National Park.....	50, 000
	<hr/> 7, 667, 000
Eggs lost.....	2, 302, 500
Fish lost.....	17, 000

Fish shipped:

Yellowstone Lake and system	2,661,000
Yellowstone Park waters	1,656,500
Transferred to Mammoth pools	500,000
Teton National Park	189,550
Teton National Forest	183,450
Shoshone National Forest (Valley Ranch)	173,000
Washakie National Forest	39,000
	<hr/> 5,402,500
	<hr/> 15,389,000

Mammoth rearing pools as of September 12, 1930

Fish shipped: Loch Leven trout fingerlings No. 4	26,250
Fish on hand:	
Black-spotted trout	500,000
Rainbow trout	200,000

GEYSERS AND HOT SPRINGS

Mammoth Hot Springs.—In general no change occurred during the winter. A marked decrease in activity during the spring and an increase during the summer is to be noted. Narrow Gauge Terrace ceased activity, but a new vent broke out at one side with increased vigor.

Norris Geyser Basin.—No distinct change in activity is to be reported.

Lower Geyser Basin.—The only important event was the cessation of activity in Imperial Geyser during October, 1929.

Upper Geyser Basin.—No special change to be reported.

EDUCATIONAL DEPARTMENT

The staff for the past year has consisted of full-time park naturalist and junior park naturalist, and 17 temporary ranger naturalists. The summer activities carried on by this staff were as follows:

Station	Field trips		Lectures		Museums, attendance	Auto caravan		Attendance
	Number	Attendance	Number	Attendance		Number	Number of cars	
Old Faithful	461	33,054	618	262,645	107,365	137	530	3,361
Mammoth	559	14,185	252	36,837	73,627	87	2,647	9,437
Canyon	209	11,578	122	31,250				
Norris					26,825			
Lake	138	5,395	352	25,431				
Fishing Bridge	68	1,920	69	13,738				
West Thumb	72	10,808	51	3,415				
Mount Washburn			50	12,520				
Power Falls	51	459	67	2,759		4	5	15
Total	1,558	77,399	1,581	388,595	207,817	228	3,182	12,863

The educational program has received an enthusiastic response from visitors throughout the season. The above table will show the number served during the summer. The Norris Museum containing geological exhibits was opened on July 5, and the historical museum at Madison Junction on July 11. Both of these have functioned well during the summer. The back room of the Mammoth Museum has been completely equipped with new wall and island cases containing geological, historical, and Indian exhibits, and has caused considerable comment. Construction of a new museum was begun at Fishing Bridge.

An auto caravan was instituted at Mammoth Hot Springs and served a great many persons who would not have otherwise received attention. Three new illustrated lectures were started during the summer; one at the Mammoth Hotel, one at Lake Lodge, and one at Canyon Lodge.

Drs. H. C. Bumpus, Harold C. Bryant, Frank R. Oastler, and Wallace W. Atwood, members of the President's Commission on the Educational Work in the National Parks, visited the Yellowstone during the summer.

IMPROVEMENTS BY PUBLIC UTILITIES AND INDIVIDUAL OPERATORS

Additional facilities completed or under construction during the year by the various public operators are as follows:

YELLOWSTONE PARK LODGE & CAMPS CO.

Mammoth.—Six comfort stations and 36-foot addition to horse barn; 50 permanent cabins, thirty 12 by 12 and twenty 12 by 20; 2 comfort stations in housekeeping unit in public automobile camp.

Old Faithful.—Two-story building, L-shaped, 70 by 50; comfort station, 18 by 36; 147 permanent log and frame cabins; comfort station, 18 by 36.

Lake.—Ten permanent log and frame cabins and comfort station; 130 permanent log and frame cabins in housekeeping unit in public camp ground; building for woodhouse, 16 by 24.

Canyon.—Seven permanent log and frame cabins; 2-story building, 30 by 60; 64 permanent log and frame cabins, comfort station 18 by 36 and comfort station 16 by 30 in housekeeping unit in public auto camp.

West Thumb.—Twenty-seven permanent log and frame cabins and comfort station, 16 by 30, in housekeeping unit.

YELLOWSTONE PARK HOTEL CO.

Lake.—New storage warehouse.

Canyon Hotel.—New wing of 96 rooms, with bath.

YELLOWSTONE PARK TRANSPORTATION CO.

Gardiner.—Three 2-car concrete garages.

YELLOWSTONE PARK BOAT CO.

Purchased 28-foot Chris Craft speed boat.

RELIGIOUS SERVICES

During July and August Catholic masses were held in the chapel at park headquarters at 6 a. m. and 8 a. m. every Sunday. Protestant services were held every Sunday at 10.30 a. m. and 8 p. m., during the tourist season, by ministers of various denominations from Livingston and other points in Montana.

During the winter Protestant services were held frequently by visiting ministers, mostly from Montana.

A bronze tablet giving in brief the history of the building of the chapel was donated by A. L. Rule, of Mason City, Iowa, and was dedicated by a short ceremony on July 9, 1930, after having been placed in an appropriate position on the front of the building near the entrance.

POST OFFICE

In addition to the main office, classified postal stations under the management of regular postal employees were maintained during the tourist season at Old Faithful and at Fishing Bridge. Three contract stations were also maintained during the tourist season at Lake Outlet, Canyon, and Tower Falls, respectively.

Star routes connected these stations with the main office, giving daily service. Another star route connected the main office with West Yellowstone, Mont., and Old Faithful postal station with West Yellowstone, Mont.

The average business of the postal department in the park is about 20 per cent under the business for 1929, due mostly to decreased travel to the park.

VITAL STATISTICS

There was 1 death due to accident and 12 deaths due to natural causes. There was 1 birth.

COOPERATING BUREAUS

The Bureau of Public Roads of the Department of Agriculture, the United States Public Health Service of the Treasury Department, the Bureau of Entomology of the Department of Agriculture, and the Bureau of Fisheries of the Department of Commerce have all cooperated to the fullest extent with officials of the National Park Service in Yellowstone during the year just closed. Members of the Geophysical Laboratory of the Carnegie Institution, Washington, D. C., were engaged in research work in Yellowstone during the summer.

YOSEMITE NATIONAL PARK

C. G. THOMSON, Superintendent, Yosemite National Park, Calif.

GENERAL

Yosemite has enjoyed a very successful year from almost every viewpoint. For the fourth successive year its travel has been practically stabilized at a little above 450,000 visitors. Due to rapidly improved physical layouts and a gradually bettered organization, this enormous travel has been handled with a minimum of disorder, accident, or detriment to the various features that make Yosemite distinctive.

This year has doubtless witnessed a most appreciable widening of our contact activity. The ranger and ranger-naturalist groups have functioned excellently. I do not see how these two groups can accomplish more except by increase in personnel. The stabilization of travel has been a most helpful factor, permitting us to handle peak travel loads efficiently. Except on Memorial Day and on the Fourth of July there has been no semblance of congestion even on the floor of the valley. Through the acquisition of certain private holdings and in innumerable smaller ways there has been a consistent progress made toward the reduction of Yosemite to a simple national-park status.

ADMINISTRATION

Appropriations.—Appropriations for the fiscal year included \$320,000 for administration, protection, and maintenance; \$87,360 for construction; \$508,325 for roads and trails, major projects; \$138,998 for roads and trails, minor projects; \$10,000 for fire prevention; \$302 for emergency fund; or a total of \$1,064,985 expended on Yosemite projects. In addition to this amount John D. Rockefeller, jr., donated \$1,700,000 for the purchase of private lands, which was matched by an equal amount of Government funds; Doctor Tresidder contributed \$10,500 for the purchase of private lands; and James Schwabacher contributed \$500 for the erection of a boundary marker on the western entrance to the park.

Revenues.—Revenues for the fiscal year included \$162,598 for automobile permits, \$8,943.25 from the public-utility operations, \$49,585.89 from the electric system; \$25,495.71 from telegraph and telephone receipts, and \$33,849.60 from water and miscellaneous receipts, or a total of \$280,472.45.

Personnel.—Total personnel included a maximum of 68 permanent employees, a maximum of 360 per diem employees, and a maximum of 69 temporary secretarial appointees.

Messrs. James B. Robinson and Frederick Bruschi were retired for superannuation after many years of faithful service; Park Engineer O. G. Taylor was promoted to a higher engineering status at the Washington office; F. L. Conner's position was abolished effective June 30; Assistant Park Naturalist Harold E. Perry resigned and was replaced by George Crowe; Clifford Presnall was appointed to the new position of museum preparator.

Following hard upon the saddening news of Mr. Mather's passing Yosemite suffered further losses by the death of George R. McNabb, park carpenter for many years, and now by the passing of former Superintendent W. B. Lewis. A deep sorrow pervades this community.

Mr. H. B. Hommon, of the United States Public Health Service, has been particularly active and helpful throughout the year, especially in connection with the sewage-disposal plant now under construction. Of the National Park Service staff Mr. Wosky, of the landscape architect's office, was assigned here throughout the construction season and contributed largely; Chief Engineer Kittredge was very helpful in many ways; the purchasing of a large amount

and wide variety of equipment by his office was done better than we could have done it. Dr. Harold C. Bryant spent much of the summer in Yosemite helping shape our naturalist endeavors and was especially helpful in the operation of the Yosemite School of Field Natural History.

Cooperating agencies were active in our behalf as needed, but the list is too long to chronicle here. The advisory board was in session nine days, in three sessions, contributing to the solution of Yosemite's long-term problems.

United States Commissioner William D. Fullerton tried 20 cases; there were 18 convictions and a total of \$699 imposed in fines. There were no jail sentences.

CONSTRUCTION

Out of this year's very heavy construction program I have space for only the most important projects.

1. *National Park Service construction.*—Four-family apartment house, \$12,000; staff officer's residence, \$6,000; naturalist outpost station at Mariposa Grove, \$3,800; ranger station at Glacier Point, \$3,800; extensive camp-ground developments, \$10,000; a 3-mile water line at Tuolumne Meadows, \$15,000; extensions to the water system, sewer system, electric system, and telephone systems, \$18,200; the development of seven picnic grounds, \$3,000; reconstruction of pipe-line trestle, \$10,000; and a miscellany of minor improvements.

The most vital improvement was the construction of a complete new sewage disposal plant located at the lowest practical point in the valley so as to assure gravity flow from any future development. It includes a modern activated sludge-disposal system and about 3 miles of main sewer lines to connect with the existing system at the upper end of the valley. It permits the elimination of the present inadequate disposal plant and solves a series of problems heretofore very difficult. The cost was \$141,000.

2. *Roads and trails, minor projects.*—Under this caption come a wide miscellany of jobs, including the elimination of certain old roads; a re-signing of all our paved roads; parking areas and other improvements at the Mariposa Grove; the Tioga Road betterment; the Big Oak Flat Road betterment; oiling of newly constructed roads and the Hetch Hetchy Road from the park line to and including Mather ranger station; 6 miles of new bridle paths; the construction of a new and very high standard trail from Happy Isles to Merced Lake; the correction of hazardous road alignment at Cascades. The above jobs required the operation of five messes in various parts of the park.

3. *Roads and trails, major projects.*—Under the efficient supervision of Resident Engineer H. S. Tolen, of the Bureau of Public Roads, 9 miles of road were graded on the new Wawona Road by Contractors W. A. Bechtel, Welch, and Murdock, Contoules Construction Co., and the Connolly Construction Co. Roadside clean-up was initiated, and 8.5 miles of the new grade was beautifully conditioned for interim use by the use of light oil, pending macadamizing.

Under Mr. Tolen's direction, location surveys were completed on the Crane Flat-Mather Road, the Mather-Harden Lake Road, and the Chinquapin-Glacier Point Road. With the aid of various cooperating agencies the very difficult problem presented by the Turtleback Dome-Bridalveil section of the Wawona Road was finally settled by a decision to tunnel. This last contract will complete the grading of the new Wawona Road.

Roads and trails, Raker Act.—In August the city of San Francisco set up \$50,000 and actually got under way the construction of the first physical improvements to which it is obligated by the Raker Act. With this cash allotment the city engineers started construction of the trail on the north side of the reservoir from a point on the Lake Eleanor Road toward Tiltill. This work is being done by city engineers with their own crews, but on plans and specifications approved by us and under day-to-day scrutiny from this office, especially by the landscape division.

The Mather Station-Harden Lake Road, another Raker Act obligation, has been reduced to final location survey, but no funds have yet been allotted.

Maintenance

Roads and trails	1929	1930
Roads, number of miles (paved roads, 34 miles; mountain roads, 128 miles).....	162	162
Trails, number of miles (includes 15.23 miles of bridle paths and 6.72 of foot paths).....	630. 80	641. 80

Thanks to the availability of much more suitable equipment, and of special funds for betterments that have heretofore absorbed our maintenance funds, road maintenance this year was notably superior to previous accomplishments.

The bulk of our expenditures went into an intensive oiling program of mountain roads. As a result there was a decided improvement in the old Wawona Road to the Big Trees, and particularly in the Big Oak Flat Road; in fact, all unpaved roads except the Tioga from Aspen Valley to Tioga Pass were improved with oil, and the Tioga Road itself was maintained considerably better than heretofore. The alleviation of the dust evil was greatly appreciated by visitors. The oiling program also included the treatment of various roads to picnic grounds, etc., on the floor of the valley.

Maintenance of the High Sierra trails was this year transferred to supervision by the various district rangers with satisfactory results. As we have available for maintenance purposes on this system of over 600 miles of high-country trails an allotment of less than \$5 per mile, their condition becomes progressively worse, an unfortunate fact in view of the increased use of the high country by park visitors.

Buildings.—There is no question that our general tendency is downward in the maintenance of park buildings. Every year essential repairs consume our allotment, leaving no funds for protective painting and the miscellaneous upkeep needed to preserve them. This year, as usual, our funds went into a wide miscellany of the most pressing repairs.

Electric system.—Light and power were furnished for all Government and operators' purposes throughout the year. During periods of very low water, additional requirements were supplied through our hook-up with the San Joaquin Light & Power Corporation. The proposed contract with this corporation mentioned in my last year's annual report was not consummated. Very extensive additions to our system of distribution will therefore need to be budgeted by the Government in the immediate future.

The cracking of one of our two scrolls in the power house was remedied by a very delicate process of electric welding accomplished in San Francisco under inspection by the office of the chief engineer. Many vital improvements were made to both the generating and distributing systems to take care of constantly increasing demands. Interruptions of service were very few and of short duration, due more to good fortune, however, than to inherent strength of our system.

During the year ended June 30, 1930, 7,895,740 kilowatt-hours were generated; 2,629,576 kilowatt-hours were sold to park operators; 155,559 kilowatt-hours were furnished to the post office; 2,771,736 kilowatt-hours were used by the National Park Service or lost in transit; and 2,454,110 kilowatt-hours were purchased from the San Joaquin Light & Power Corporation. The net profit for the year amounted to \$18,919.64.

Telephone and telegraph systems.—There was an appreciable improvement in our telephone system. New cables were laid to the W. B. Lewis Hospital, to the fish hatchery, and to all newly constructed units; various switchboards were thoroughly overhauled and lines conditioned and modernized as funds permitted; a new 21-mile forest line was constructed from the South Fork ranger station to Buck camp, furnishing our first telephone communication into this large area. Shorter lines were constructed to new fire-lookout stations at Magill Meadows, from Aspen Valley to a lookout peak near by, and from Crane Flat to a near-by lookout. There was an excellent maintenance of the entire system. I must make special mention of the splendid service rendered by the corps of telephone operators under supervision of Mrs. Florence Hoyt, chief operator.

The operation of the telegraph system continued as heretofore. Under a contract now in final preparation, the Western Union is expected shortly to relieve us of this operation.

Sanitation.—This operation was excellently accomplished under the supervision of E. M. Hilton. Garbage collection was methodically performed; a total of 27,479 cans was handled, of which 316.38 tons were sold for hog feed. The valley incinerator received an extensive overhauling. Incineration costs were \$0.151 per can, or a reduction of \$0.02 per can over the same period last year, and \$2.51 per ton, or a reduction of \$0.35 per ton over the same period last year.

A very close check was maintained as to water-supply pollution. In mid-August unfavorable laboratory reports led to the prompt installation of a chlorinating device for use when and as needed. Mr. Hommon's activity and advice

proved invaluable in all such matters. All outpost activities have received the necessary surveillance as to water supply, sewage disposal, and other sanitary requirements. A systematic policing of all circulation areas, grounds, etc., was accomplished. Certain of the worst old refuse dumps, such as those at El Capitan and Glacier Point, received all the remedial attention possible within funds available.

Mosquito control was not so effective in Yosemite Valley as during the year before, due largely to unanticipated raises in the Merced that several times flushed out oil previously distributed. Better success accompanied the efforts in Tuolumne meadows. We have not yet worked out an entirely satisfactory method of mosquito control. Some attention was devoted to the eradication of flies, mice, and other vermin. Considerable time was devoted to the study and planning of major sanitary improvements that must soon be forthcoming.

Mechanical department.—An innovation this year was the intensifying of the work of this department during the off season. In mid-December a crew of selected mechanics began a thorough overhauling of the most essential equipment. Twenty-two motor vehicles were completely overhauled and all others were reconditioned as required. Chief Mechanic A. H. Kottbauer accomplished a great improvement in all of our equipment, including painting, in standard colors, with lacquer. In consequence, our equipment went into the construction season in excellent condition and has stood up splendidly under the strain. There is no question as to the economies thus effected. This off-season period of intensive mechanical repair work will be continued indefinitely.

There has been a bettered general maintenance of all equipment. A greaser and washer conditions all rolling equipment at night as required. Certain time and labor-saving equipment added to the mechanical department has been an aid to economy and efficiency. An important innovation has been the pooling under one dispatcher of all rolling equipment. Practically all equipment now comes under mechanical inspection daily.

A serious condition arises due to lack of storage sheds, compelling the exposure of much costly equipment to the weather.

Miscellaneous.—All of these construction and maintenance jobs required the employment of suitable crews, the operation of numerous messes, pack trains, the wise assignment of equipment, and a multitude of painstaking detail. All of this minutia was excellently organized by Assistant Park Supervisor F. B. Ewing. Under President Hoover's policy for unemployment relief, we opened spring work as early as possible and carried it on to the exhausting of funds in the fall. Also where hand work was as economical as machine work, we used hand methods, as in the miles of trenching for the new sewage-disposal system. Many economies were accomplished, particularly in the purchase, transportation, and handling of supplies. A new and much better warehousing system was also initiated.

Snow removal.—The continued use of inadequate equipment for snow removal puts us at a serious disadvantage in the maintenance of roads and parking areas and unreasonably delays the opening of the high mountain regions.

USE BY THE PUBLIC

Travel via private motor vehicles, by entrance stations and roads

Entrance station	Road	Number of automobiles		Number of people		Motor cycles			
						Number		People	
		1929	1930	1929	1930	1929	1930	1929	1930
Arch Rock.....	El Portal.....	84, 188	87, 022	270, 400	265, 176	136	132	159	178
Mariposa Grove.....	Wawona.....	12, 498	13, 881	40, 562	45, 169	17	9	23	12
Alder Creek.....	do.....	9, 425	10, 144	27, 614	30, 207	9	17	14	18
El Capitan.....	Big Oak Flat.....	11, 010	12, 264	32, 366	35, 294	15	8	19	13
Aspen Valley.....	Tioga.....	5, 933	6, 567	16, 333	17, 551	1	1	1	1
Tioga Pass.....	do.....	7, 359	7, 004	20, 592	19, 334	18	6	21	8
Mather.....	Hetch Hetchy.....	2, 490	4, 209	8, 097	13, 178	3	3	3	3
Total.....	.....	132, 903	141, 091	415, 964	425, 909	199	176	240	233

SUMMARY OF VISITORS TO YOSEMITE NATIONAL PARK

	1929	1930
By private automobiles.....	415,964	425,909
By motor cycles.....	240	233
By Yosemite Valley Railroad.....	12,230	8,726
By stages (other than El Portal stage).....	31,806	21,427
By wagon, horseback, and on foot.....	1,017	2,271
Grand total.....	461,257	458,566
Number of visitors using camp grounds, estimated.....	105,000	117,600
Name and number of camp sites in each:		
On valley floor.....	5	
Tuolumne Meadows.....	1	
Mariposa Big Trees.....	1	

An outstanding feature of the season's travel was the heavy reduction in railroad and stage travel and the increase in use of private vehicles; it is to be noted also that there was a fractional reduction in the number of persons occupying each private vehicle.

Camp grounds.—Improvements made to our camp grounds in the valley were much appreciated and unquestionably were conducive to heavier use. Probably the general business depression also contributed to an increased popularity of these free camp grounds. The increase in use of camp grounds is estimated at 12 per cent. The total number of campers during 1930 is estimated at 117,600 in the valley and 11,000 in the high-country camps. There was a total of five camps in use on the valley floor and also camp grounds at Tuolumne Meadows and at the Mariposa Grove of Big Trees. The greatest number of campers counted on any one day this year was on July 5, when a total of 6,896 persons camped in the public camp grounds on the valley floor (actual count), and an estimated total of 435 camped in other parts of the park.

Fishing and fish planting.—The best fishing in our history was enjoyed this year. Reasonably competent fishermen caught the limit consistently. There is no aspect of park use that is more appreciated than this improvement in fishing conditions which is gradually being attained with the years. The State hatchery at Happy Isles turned over to us 1,045,000 trout fingerlings, which were transported and planted under the personal direction of Chief Ranger Townsley. The closing of some tributary creeks and certain lakes proved beneficial. Lake Eleanor was kept closed until June 15 and will be further experimented with as a probable egg-taking station.

Miscellaneous.—There unquestionably was an augmented use of the high country by hikers and pack trains. The construction of fine base trails out of the valley was one stimulating factor. The improvement of the John Muir Trail and its use by distinguished parties of national fame, with attendant publicity, is gradually having its effect. As an example of this more intensive use of the High Sierra, I personally camped one night with the Doctor Atwood and the John W. Davis parties, the combined pack trains totaling 117 animals. Good horse feed is a control in this use; hence prohibition of grazing in Yosemite after this summer is certain to make this a Mecca for these enthusiasts. Our lush pastures and better-maintained trails form a sharp contrast with conditions existing outside.

The prohibition of entrance into Yosemite of pack and saddle animals rented by other than the park operators presents a problem for which a formula has not yet been found that is fair to all concerned, especially to the park visitor.

All of our contact groups are convinced that this year again there was an increased orderliness and desire to play fair with the park on the part of visitors. There was an increased appreciation of our gropings toward a better service to them. It has been a pleasure for all of us to contribute what we could to their safety, comfort, and enjoyment.

Dust is a condition which still seriously mars the full enjoyment of the park by visitors, particularly in the circulation areas. A majority of the road system and some of the base trails have been oil treated, but the general dustiness under foot in such areas as the Mariposa Grove is a distinct detriment to the full pleasure derivable. We must find a way to combat this nuisance, preferably by intermittent sprinkling.

MUSEUM AND PARK NATURALIST

The educational activities were marked by a better and a more intimate service to the public. Park Naturalist Harwell gathered around himself a group of permanent and temporary naturalists and inspired them with a spirit of which I was very proud.

The increased allotments authorized by you permitted extensions of service and closer contacts with visitors by the addition of five naturalists. Among new features was the auto caravan, a device by which the ranger-naturalists conducted groups of visitors, each traveling in his own car, to various points of interest for informational lectures on geology, flora, etc. This was highly successful and has been added to our routine. Our educational division took over the evening bear lectures at the riverside. A very popular innovation was our so-called live Indian exhibit, featuring Maggie Howard, a life-long Indian resident of Yosemite Valley, who demonstrated behind the museum such Indian activities as basket weaving, cooking, songs, games, Indian art, and Indian lore. This excellent service was made possible by use of funds of the Yosemite Natural History Association.

All-day hikes to the rim of the valley proved very successful. An average of 41 persons accompanied naturalists on each of the 42 trips made during June and July. A Junior Nature School was also organized experimentally, and with certain modifications promises to be very useful.

Educational department summary

	1929		1930	
	Number	Attendance	Number	Attendance
Museum visitors.....		150,000		¹ 141,420
Museum lectures.....	219	11,230	579	¹ 21,457
Auto caravans.....	20	887	99	¹ 5,704
Rim trips.....	19	582	57	2,044
High Sierra trips.....	4	40	10	124
Special parties:				
Trips.....	14	448	22	¹ 697
Lectures.....	2	220	29	¹ 3,097
Mariposa Grove outpost:				
Trips.....	323	4,291	324	6,700
Lectures.....	86	2,705	496	9,300
Glacier Point outpost:				
Trips.....	51	825	32	77
Lectures.....	210	13,774	329	23,437
Yosemite Junior Nature School.....			35	87
Yosemite School of Field Natural History.....		20		1
Guided trips in valley.....	261	5,822	138	4,122
Lectures at resorts in valley.....	176	80,555	145	¹ 78,497
Lectures at bear pits.....	12	4,325	107	¹ 68,237

¹ Figures for September, 1930, not yet complete. Report covers May, June, July, August, and September.

The museum was immensely useful, continuing to serve as the hub of the entire educational wheel. The outpost naturalist stations functioned as heretofore and flora exhibits and miniature zoos were well maintained. Labeled exhibits and weekly distributions of mimeographed programs all proved of great interest. The success of this entire ranger-naturalist activity rested not so much in the appropriateness of its equipment and facilities as in the intense humanness of its personnel and their zeal to be as useful as possible regardless of clock or weather.

The Yosemite School of Field Natural History enjoyed a successful year with students from four States, graduating a class of 18.

PROTECTION

The permanent ranger force continued at the insufficient level of 16 men reinforced during the summer season by 39 temporary rangers, most of the latter, fortunately, being men with previous experience here. This ranger group functioned with increased smoothness and with a real sense of public service. The various activities were departmentalized with carefully selected heads, the

breakdowns being into divisions of public order and traffic, fire prevention and suppression, outpost stations, and information. The district rangers were given much more responsibility and authority than heretofore. Their duties were expanded, for example, to include the maintenance of trails.

As heretofore, the rangers reported, as time permitted, to the naturalist department for educational training in natural history, this to permit each ranger to better serve visitors encountered.

Intensive preparation for such peak travel loads as Memorial Day and the Fourth of July enabled this organization to handle very heavy travel with no confusion or disorder.

Ranger Herschler and Temporary Ranger Ballou made intensive studies and reports on certain phases of forestry which had given us concern. All of the sequoias in the Tuolumne and Merced Groves were carefully remeasured and the areas of all three groves remapped as a basis for guide pamphlets to be issued shortly. Expert advice from the outside was drawn upon as freely as possible in the continued study of the care of these superb groves of sequoias in relation to their use by the public. A careful reconnaissance of the entire Rockefeller addition was made. This reconnaissance, later compacted into a report and type map, I hope will be a forerunner of reconnaissances to eventually cover the entire park.

Ranger Adair accompanied Dr. Kenneth Salinan, of the Bureau of Entomology, on a field study of insect infestations and subsequently supervised control measures recommended. While infestations are not epidemic in any Yosemite areas, there are endemic attacks in restricted areas by insects native to these forests.

With the active cooperation on the ground of Fire Control Expert John D. Coffman, our fire prevention and suppression facilities were modestly extended. Additional lookout tents were erected at Aspen Valley Hill, Magill Meadows, and Crane Flat Hill. Telephone communication was established and fire guards were hired and trained during the fire season. Four additional Ford pick-up trucks were provided for this work, together with one 2½-ton fire truck.

The Forest Service cooperated very closely with us in this mutual problem. Their Signal and Pilot Peak lookouts are invaluable to Yosemite, and they thoughtfully permitted us again to send a selected ranger to their fine school of fire fighting.

Due largely to unusually favorable weather conditions and somewhat to improved training and facilities, Yosemite enjoyed a record year, sustaining a total loss of only 5.85 acres in its forests through fire. There were 10 fires.

There is no doubt that in equipment, training, and fire consciousness we have made fine progress these last two years, but much remains to be provided and accomplished for the protection of the magnificent forests which, though Yosemite's second greatest scenic asset, are our first responsibility.

Our participation in winter sports continued entirely in the hands of the ranger department, which did as well as circumstances and limited personnel permitted. The maintenance of "ash-can alley" by the rangers was very popular, especially in the unfavorably warm weather that almost uniformly marked our week ends, and became one of the mainstays of winter sports. However, I am inclined to doubt the wisdom of its continuation as a Government activity.

The ranger department, in cooperation with State and irrigation interests, made numerous and arduous snow-gaging patrols all winter, rendering a service much appreciated by surrounding communities, to which accurate predictions of run-off are extremely important.

The increase in the temporary ranger staff was utilized for the bettered patrolling and handling of the upper country. Such areas as that between the Illilouette and the South Fork of the Merced were brought under strong park control, a satisfaction not heretofore possible because of lack of personnel. In general there was much more patrolling and a better grasp of the entire park problem than we have attained previously.

FAUNA AND FLORA

Acting on the advice of Messrs. Wright and Dixon, who are collaborating in a study of wild-life problems, we made considerable progress with the bear problem. Our entire effort is to eliminate bears from inhabited areas and to restrict them to the lower portion of the valley. By appropriate feeding, the

use of a few selected dogs, a bear trap, and other devices we eliminated much of the depredation formerly suffered by visitors from bears.

In an effort to restock the Tuolumne country with deer, following their decimation several years ago during the foot-and-mouth disease campaign, several truck loads of deer and fawns were transported to Magill Meadows last spring and again this fall. Some of these animals were identified to permit a further study of their movements. A concomitant benefit was the reduction in the number of deer which have been overgrazing the meadows of the valley.

Gray squirrels again showed an encouraging increase in numbers. For the first time in several years marmots seem to be increasing. As an indication of their scarcity, however, I personally saw only eight along over 250 miles of trails ridden. Ring-tailed cats continue abundant, some becoming so tame as to afford much pleasure to visitors. Weasels are often seen. The abundance of cougars, wolverines, and coyotes is, as usual, a matter of controversy. One cougar cub was donated to our zoo by State Lion Hunter Jay Bruce. Our exhibit of valley elk was continued as heretofore in the valley paddock. Because of their exotic character and their utilization of precious valley acreage, we, at Yosemite, are in general agreement of their undesirability here. Only three calves were born last spring.

Both the abundance and variety of bird life was subnormal this year.

Wild-life estimate

	Condition	Number (estimated)
Bears, California black.....	Very good.....	350
Bobcats.....	do.....	75
Coyotes.....	do.....	300
Deer, California mule.....	Good.....	16,000
Fishers.....	Very good.....	30
Foxes.....	do.....	250
Gray squirrels.....	Good.....	50
Marmots.....	Very good.....	60
Martens.....	do.....	350
Minks.....	do.....	25
Mountain beavers.....	do.....	100
Mountain lions.....	do.....	11
Otters.....	do.....	30
Porcupines.....	do.....	60
Band-tailed pigeons.....	do.....	200
Great blue herons.....	do.....	2
Grouse.....	do.....	1,000
Horned owls.....	do.....	18
Quail.....	do.....	1,500
Golden eagles.....	do.....	6

Flora.—The forests continued, fortunately, exempt from epidemic insect infestation, and reproduction appears to be uniformly favorable. In fact, due to our disturbing the natural balance by rigid fire suppression, there is a strong tendency throughout the park toward the encroachment of forests into the innumerable meadows which give this park much of its charm. This is a tendency which will require very careful pondering and eventual action.

In Yosemite Valley there was a great improvement in the lushness of the meadows and the recovery of wild flowers, improvements due principally to the prohibiting of all grazing and burning and to the scarcity of deer on the valley floor. Exotic plants are no longer being introduced into Yosemite by residents. A considerable acreage of the park was this year relieved from cattle grazing, but recovery from past damages is not immediately discernible.

PARK OPERATORS

There were no innovations in the operation of the Best, Boysen, and Foley studios. The operation of the Degnan store continued as heretofore, and there were numerous favorable comments because they opened about an hour earlier and did not close for several hours after other stores in the village were closed.

The Yosemite Park & Curry Co. made no outstanding physical improvements. However, they contributed heavily to Yosemite's year-round usefulness by emphasizing the development of winter sports. High points in these winter pleas-

ures included the sponsorship of a championship cup by President Hoover, won by the University of California. Speed-skating and figure-skating experts gave special exhibitions, and numerous appropriate contests were organized. Over 100,000 visitors participated variously in tobogganing, skating, sleighing, snowshoeing, etc. Two teams of "husky" dogs contributed atmosphere and keen enjoyment. A ski lodge was maintained by the company at Snow Creek for snow sports available in that vicinity and as a snowshoe rest house on the winter route to the Tuolumne regions. Expert instructors were available throughout the season, which closed February 22. The weather was not normally favorable, but the winter program, despite this handicap, was a wholesome and picturesque public service.

Special attention was again devoted by Dr. Don Tresidder to the High Sierra units, from the use of which we have had an almost uniform reaction of praise. The Boothe Lake camp was moved to a more ideal location on Fletcher Lake. Unfortunately, it was necessary to close the Big Tree Lodge at the Mariposa Grove on August 10 because of complete failure of the water supply.

A small pitch-and-putt golf course made an attractive addition to the Ahwah-nee grounds.

As previously, I have to report fine cooperation from the operators. The Yosemite Park & Curry Co. suffered the same decline in revenues that seemed common to all American business men this year.

ACQUISITION OF PRIVATE LANDS AND PARK ADDITIONS

After years of frustrations, the main private holdings surrounding the Crane Flat area were at last saved from the axe for all time. Mr. John D. Rockefeller, jr., out of a fine public spirit and rare generosity, donated \$1,700,000, this sum being matched out of congressional appropriations. The loggers of the Yosemite Lumber Co., actually at work in this area, were halted by the Albright-Fleming agreement signed in August, 1929, and the final contract under which we acquired title was signed in May, 1930, after long and intricate negotiations.

Thus one of the most superb stands of sugar pine in the world came into our keeping and that portion of the park was saved from unspeakable spoliation. The topography of the newly acquired area permits of the construction of a much-needed highway north out of Crane Flat to connect with the scenic route along the south branch of the Grand Canyon of the Tuolumne that is soon to be accomplished.

Under authority of the Englebright bill of March 7, 1930, 956 acres in the Stanislaus National Forest were added to the western boundary of the park. On April 14, 1930, by presidential proclamation, 7,725.19 acres additional were added, making the total acreage added to the park 8,681.19.

As superintendent, I submitted a recommendation as to the boundaries of this park addition, a recommendation that was accepted except for two slight adjustments. I had no further part in subsequent negotiations, as the financial and legal complexities demanded the services of experts working directly with Washington and the Rockefeller representatives.

Through the generosity of Dr. Don Tresidder, president of the Yosemite Park & Curry Co., who contributed \$10,500 to be equally matched from congressional appropriations, 520 acres of private holdings at Crane Flat and Gin Flat were acquired.

The intense interest of Hon. Louis C. Cramton in the accomplishment of this fine conservation is deeply appreciated.

One of the fine by-products of the acquisition of these large private holdings was Secretary Wilbur's memorandum prohibiting grazing in Yosemite National Park after the current year. Under the provisions of his memorandum no grazing is possible except upon the comparatively small areas still in private ownership which, for practical purposes, is prohibitory because of the expense of fencing these areas for such limited use. It is expected, too, that these private holdings will be absorbed shortly, either by friendly negotiation or by condemnation under existing laws.

The Best and O'Connor exchange authorized by congressional act is still in abeyance and the subject of special study.

MISCELLANEOUS

Medical and dental services.—The new W. B. Lewis Hospital, operated by Dr. Hartley G. Dewey, marked a new era in hospitalization at Yosemite and contributed a highly appreciated improvement over former conditions. From its initiation on December 20 to September 1 there were 4,421 office calls, 115 house calls, 22 major operations, 250 minor operations, 13 births, and 8 deaths.

Dr. R. E. Davies continued as park dentist, moving into the dental clinic at the new hospital. During the year he treated 260 patients.

Church activities.—Yosemite church activities have been splendidly coordinated under the direction of Dr. James Asa White. Meager facilities available have been apportioned by him to the satisfaction of the various sects, and a fine feeling pervades this essential activity. Indicating the need for an adequate church, from May to August, inclusive, there was an attendance of 8,210 at the Catholic services and a total of 10,744 worshippers at the non-Catholic services, or a total of 18,984 during the period of four months.

In anticipation of the use of Hetch Hetchy waters in the mains of the city of San Francisco in about two years, the development of Tuolumne Meadows was initiated this year from the viewpoint of the prevention of contamination of the Tuolumne River. As a first step, a \$15,000 water supply was brought into an area which will be developed with funds to be budgeted later. A more concentrated camp ground and other logical developments are to be serviced by a modern sewage disposal plant.

A comprehensive signing program was initiated this year, the floor of the valley being undertaken first. The three sequoia groves were also signed in part. Our aim is a series of informational signs over roads and trails, each distinctive and self-explanatory.

All wood used for fuel has been cut from trees dropped last year for road right of ways. No Yosemite timber has been used for lumber, shakes, or similar purposes. The few small logs required for construction purposes have been selected by the landscape architect from growths that obscured vistas.

RECOMMENDATIONS

1. The rounding out of Yosemite's logical boundaries before commercial developments introduce further complications.
2. An early completion of the private-land acquisitions, certain of which, specially the Cascade tract, have become serious administrative difficulties.
3. Addition of a scientific forester to the Yosemite personnel.
4. Installing the type of housekeeping cabins to which tourists have become habituated.
5. Augmenting of maintenance allotments which have not kept pace with the progress of construction.
6. Appropriation of funds for a chapel in Yosemite, since the anticipated erection of a memorial church seems to have been definitely abandoned.

ZION NATIONAL PARK

EIVIND T. SCOYEN, Superintendent, Springdale, Utah

The year in Zion Park was featured by the following events:

1. Completion and dedication of the Zion-Mount Carmel Highway.
2. Amazing increase in travel of 65.6 per cent.
3. Continued improvement of approach highways by reconstruction and improvement of bad sections and oiling operation on important sections.
4. A substantial increase in the demand for educational service.
5. Appropriations which have enabled us to put a reasonable control on the Mukuntuweap River.
6. Approval of bill extending the park boundaries.
7. Steady progress of mapping of park area by the United States Geological Survey with probable completion of the job this season.

WEATHER CONDITIONS

Temperature conditions during the year were practically normal. The high mark was 102°, on the 4th and 8th of July, and the low 10° above, on January 14. The total precipitation was 12.89 inches and was 2.35 below normal. The feature of the year's weather was the drought, extending through October

November, and December, as not a drop of rainfall occurred during these months. The month of January started off with one of the worst snowstorms ever to sweep over the southern Utah section. Starting on January 9, it stormed practically without a break until the 18th. Twenty-seven inches of snow were measured on the ground at the Temple of Sinawava, the greatest depth ever recorded on the floor of the canyon. It was during this storm, on the night of the 10th, that Maurice Graham, pilot for the Western Air Express, was lost. Although practically a continuous search was carried on, the lost plane was not found until June 24, about 10 miles north of our north park boundary line. The search was then continued until July 16, when his body was found about 4 miles above the park.

PARK TRAVEL

The opening of the Zion-Mount Carmel Highway to general traffic on July 3, combined with the increased interest in this park, resulted in a heavy increase in travel. From the weather and road condition standpoints the year was very favorable to auto travel. The total number of visitors amounted to 55,297, an increase of 21,914 or 65.6 per cent over the 1929 travel year. The heaviest travel during any month was in July, when 13,681 entered.

Of the above total, 51,202 came in 15,633 motor vehicles, an increase of 81.5 in the number of passengers, and 81.5 in the number of autos. Four thousand and fifty-six came by stage, a decrease of 1,095. Thirty-nine entered by miscellaneous means.

Visitors were registered from every State in the Union, District of Columbia, Hawaii, Alaska, and 20 foreign countries.

The following is a comparative table showing park travel:

Year	By automobile		By stage (rail)	Miscellaneous travel	Total visitors
	Cars	Passengers			
1930.....	15,633	51,202	4,056	39	55,297
1929.....	8,612	28,201	5,151	31	33,383
Increase.....	7,021	23,001	1,095	8	21,914
Per cent.....	81.5	81.5	-21	25.8	65.6

The following table shows park travel by months:

Month	By automobile		By stage (rail)	Miscel- laneous travel	Total	
	Cars	Passengers			1930	1929
1929 ¹						
October.....	411	1,204	7	2	1,213	1,361
November.....	126	396			396	368
December.....	85	275			275	184
1930						
January.....	98	316	2		318	205
February.....	406	1,404	2	3	1,409	188
March.....	600	2,161	3	3	2,167	926
April.....	1,104	4,818		4	4,822	908
May.....	1,087	3,401	20	4	3,425	2,349
June.....	2,680	8,226	868	5	9,099	6,975
July.....	3,723	12,192	1,486	3	13,681	8,546
August.....	3,651	12,020	1,170	13	13,203	7,717
September.....	1,662	4,789	498	2	5,289	3,656
Total.....	15,633	51,202	4,056	39	55,297	33,383

¹ The park travel year is from Oct. 1 to Sept. 30 of the year following.

During the year 12,509 people in 3,464 cars camped in the public auto camp.

PARK SERVICE ACTIVITIES

Construction.—The major construction job in the park was the Zion-Mount Carmel Highway, which was completed and dedicated on July 4. Work in progress on this job during the year was: Oil process surfacing on section 1, selected material surfacing on section 3, paving and guniting of tunnel, construction of bridges across the Mukuntuweap River and Pine Creek, and many small items.

The two bridges mentioned above were completed late in July. The bridge across the river is a 3-span steel I-beam structure which has been camouflaged with 54-inch redwood slabs to give it a rustic finish. The Pine Creek structure is a masonry arch type of native sandstone, and is considered by many who have seen it to be one of the most beautiful bridges in the entire country. The perfection of the stonework is made all the more impressive by the marvelous blending of rocks of several different colors and shades of color in the arch and side walls.

The river bridge is 185 feet long, with a 20-foot driveway across the center, and a 5-foot sidewalk on each side, making a total width of 30 feet. The spans are supported by two pieces of solid masonry 34 feet high. The crossing at Pine Creek is 120 feet long, and the barrel of the arch is 60 feet long and 23 feet high.

River-protection work.—One of the largest floods in recent years came down through the canyon after a cloud-burst on September 4, 1929. Even in the wide sections of the channel the head amounted to 7 feet. At three points, especially, the river started to wash a new channel, putting Zion Lodge and the public auto camp in grave danger of destruction when another such flood occurred. At one point the river cut its channel 120 feet toward the de luxe cabin area at Zion Lodge, and when it subsided the river bank was only 70 feet from the edge of the road in front of the cabins.

A deficiency estimate was submitted asking \$16,740 to control this situation. It was expected that work would be started by February in order to give protection during the spring high-water. However, the appropriation did not become available until May 1, and the work was not started until after high high-water had passed. Fortunately the spring stage of the river was the lowest on record and no further damage was done.

The park force was faced with the necessity of completing this work by July 1, as a flood may occur at any time after that date. Trucks and teams were hired, equipment purchased, and work was carried on a 2-shift basis until June 25, when the job was completed. A total of 4,775 cubic yards of rock was quarried and hand placed in seven basket dams or dikes, which were inclosed in heavy wire mesh. In addition 1,557 cubic yards of earth were excavated for the dams, and 10,660 cubic yards for channel changes. A full carload of fencing wire with No. 9 cross wires at 6-inch centers was used in inclosing the dikes.

The problem of controlling this river will be one that will never cease to trouble officials of the park. In the future a regular item for work on this river should be carried in the park appropriation, the same as is done for maintenance of other features, such as roads, trails, buildings, etc. A total of \$16,739.40 was spent on this work in Zion Canyon the past year.

Trail construction.—Very little work was done in trail construction the past year. The only important item was the installation of two drinking fountains on The Narrows footpath. Water was piped from springs across the river, and one fountain was installed in the Temple of Sinauava and the other about three-quarters of a mile up the trail. This was a greatly needed improvement.

The construction of a fine series of bridle paths on the valley floor should be the next trail development in this park.

Miscellaneous construction.—The residence for the superintendent was completed on June 28, and is no doubt one of the most beautiful buildings in the service. It is constructed entirely of native sandstone. In addition, a trail shelter cabin was built on the west rim, and considerable work was accomplished in improving the grounds at park headquarters.

Maintenance.—At the close of the period park forces had under maintenance 16 miles of road; 56 miles of trail; 16 miles of telephone line; 22 buildings valued at \$34,080; 1 public auto camp with 75-car capacity; 2 water and sewage disposal systems, one in the administrative area and the other in the public auto camp; an electric system at park headquarters connected to the lines of the Dixie Power Co.; and equipment consisting of 10 trucks, 2 passen-

ger cars, 2 air compressors, 2 air hoists, a three-fourth-yard power shovel, and numerous smaller items.

Ranger activities.—The park ranger force consisted of a chief ranger, two permanent rangers, and two seasonal rangers. Work consisted of traffic control, fire protection, assisting in educational work, general police duties, patrol work, and many miscellaneous duties.

No arrests were made for infraction of the park regulations. Only one serious violation occurred and the district attorney did not feel that it was bad enough to bring before the Federal court.

Educational work.—This department consisted of a park naturalist (temporary) and one ranger-naturalist. In addition one of the permanent rangers assisted in the information office and in other educational activities.

Active field work was carried on from June 1 to September 15. Two nature-guide trips were taken to The Narrows daily, and these were preceded by open-air lectures on the formation of the canyon at the Temple of Sinawava. In the evening lectures were given at the auto camp and Zion Lodge. The information office was kept open daily from 7.30 a. m. to 9.30 p. m.

Considerable progress was made in research work and many additional exhibits were added to our museum. We are now badly crowded for space in this building.

A summary of the season's work shows that 374 lectures were given, which were attended by 19,870 people, and 6,755 people were conducted on 197 nature-guide trips. A total of 9,916 people visited the museum, making the total number of contacts by the educational division 36,541.

A total of 643 National Park Portfolios were sold, 28 copies of Oh, Ranger! 7 of Grand Canyon Country, and 28,000 free publications were distributed. By special effort we secured 148 copies of the August, 1929, National Park number of "American Forests and Forest Life," and this was the easiest publication we had to sell.

Sanitation.—Under direction of the chief ranger an intensive effort was made to reduce the number of flies in the canyon and good progress was made. Considerable mosquito-control work was also done.

Office operations.—The office force consisted of a chief clerk, a temporary clerk-stenographer, and a temporary warehouseman. During the winter months one of the permanent rangers assisted in the office and operated the warehouse.

During the period from July 1, 1929, to June 30, 1930, the office force handled 473 purchase orders, paid 563 vouchers, issued 60 bids, drew up 72 contracts, and received and deposited \$8,755.27 in revenues. The largest number on the pay roll was 148 in June and the least 10 in January. The total disbursements from July 1 to June 30 were \$444,825.73. Books were kept for eight appropriations. The above force also handled all office work relating to Bryce Canyon Park, which made necessary two sets of estimates and reports. Approximately 2,880 pieces of mail were received and 3,100 dispatched.

Equipment purchased.—Major items of equipment purchased consisted of a three-fourths-yard power shovel, 2 Reo dump trucks, 1 electric refrigerator, 1 welding torch, and accessories. Including minor items the purchases under this heading amounted to \$16,448.46.

Engineering division.—Mr. Thomas C. Parker, assistant engineer, from field headquarters, was in the park practically all summer supervising construction work in the park. Fine cooperation was extended at all times by this official and his assistance is necessary and very much appreciated.

Landscape work.—Mr. Harry Langley, assistant landscape architect, spent the greater part of the year in the park, his major job being supervision of bridge work on the Zion-Mount Carmel Highway. In addition, he assisted in much of the other construction work. Without his assistance work on these projects would not have gone forward as well as was the case. His fine cooperative spirit is much appreciated by all officials in the park.

PARK WILD LIFE

Deer appear to be increasing and are now seen frequently along the river in Zion Canyon late in the evening. They are also becoming very tame and show but little fear of man. Early in the spring several counts were made in one trip up the canyon of over 35. The number in the park is estimated at 461.

We know very little regarding our mountain sheep, as they keep well back in the more inaccessible parts of the canyon. However, when hiking in remote

places signs are frequently seen, and, on one trip last fall, I was fortunate enough to see six in one band. We estimate 30 in the park.

Cougars leave signs frequently in the higher elevations of the park. We make no effort to hunt them down within our boundaries as it is felt that outside hunting by professional hunters should result in a reasonable control within the park itself. None have been reported in the valley, but if they do start to range on the valley floor it will perhaps be necessary to do some hunting.

In addition to the above, smaller animals are numerous, such as ringtail cats, skunks, ground squirrels, pocket gophers, etc.

During the year it was necessary to do some control work on the pocket gopher and skunk. The former was destroying many young trees in the canyon by gnawing off the roots. I think we now have this species under reasonable control, although some additional work may be necessary.

During the summer the skunks became so numerous and tame around Zion Lodge and the public auto camp that it was either a question of doing some control work or moving the people out and letting the skunks have the park. About 35 were disposed of, and in the last two months of the season we had few complaints on account of their depredations.

I have no record of coyotes, termed by some the arch predator, being seen in the park either on the rims or in the valley. A few signs of fox have been observed.

During the year considerable pressure was brought to bear to introduce a few elk into the park. These were to be taken from the State preserve at Mount Nebo. However, I have no record of these ever occurring in the park and do not care to introduce what is probably an exotic species. In addition, I know a little about the habits of elk and what they would probably do to the fields and haystacks of farmers living below the park, and this is another and, to some, more practical reason for keeping them out.

COOPERATION WITH OTHER BUREAUS

During the year the United States Bureau of Public Roads completed their 3-year job of engineering the construction of the Zion-Mount Carmel Highway. There is no need to comment on the quality of their work, as the highway itself will stand as an ever-present testimonial to a superb engineering accomplishment.

In addition to the above, we have had fine cooperation from the following bureaus: Public Health Service, Weather Bureau, Forest Service, Geological Survey, Bureau of Mines, Biological Survey, Bureau of Entomology, and the General Land Office.

To the above should be added fine cooperation from State and county officials, and also the Utah Parks Co.

INSECT EPIDEMIC

The ash tree caterpillar again made his appearance, and although the attack was not as extensive as last year considerable damage was done. Control measures will be taken next spring if funds are provided.

IMPROVEMENT OF APPROACH HIGHWAYS

During the year the section of road between Toquerville and LaVerkin was brought up to Federal-aid standards, eliminating the last bad piece of road on the approach from Andersons' Ranch. In addition, much improvement work was done on the road from LaVerkin to Dalton Wash, a distance of 12 miles, and this section is now in good condition. The State also rebuilt the section of road past Three Lakes, north of Kanab, forming part of the approach to our new east entrance.

The road from the Ash Creek Bridge to Toquerville was given the oil-process treatment early in the summer, and the remainder of the road from this point to the park was given a sprinkling of oil for dust prevention. As a result there has been no complaint on account of dust on roads in this section. I sometimes think that dust is the most annoying thing encountered by people traveling through.

ACCIDENTS

Two fatal accidents involving visitors occurred the past year, the first of this nature in the history of the park. On April 11 Albin Brooksbey, of Orderville, Utah, was killed when a lumber anchor slid down the old Mormon cable and struck him on the head. On July 8 Eugene Cafferata, of St. Louis, Mo., was killed when he fell off a ledge while descending the trail from the summit of Mount Zion.

In addition to the above, there were 10 other accidents, of which 2 were of a serious nature.

VISITORS

Never before in the history of the park have so many distinguished visitors toured the southern Utah scenic area. On July 3 a party of 150 people coming from the conference of the governors of the States of the United States, in Salt Lake City, entered the park. A large delegation from the meeting of the Western Association of State Highway Officials also traveled with the governors' party. The following governors made the trip: H. C. Baldrige, Idaho; H. S. Caulfield, Missouri; N. S. Case, Rhode Island; T. Christiansen, Minnesota; W. G. Conley, West Virginia; L. L. Emerson, Illinois; J. E. Erickson, Montana; John Hammill, Iowa; W. J. Halloway, Oklahoma; H. G. Leslie, Indiana; J. C. Phillips, Arizona; John Pollard, Virginia; John Trumbull, Connecticut; A. J. Weaver, Nebraska; and George H. Dern, Utah. The following lieutenant governors: J. T. Brown, Ohio; and Arthur H. James, Pennsylvania. Ex-Governors C. A. Hardee, of Florida, and F. W. Plaisted, of Maine, were also present.

Other distinguished people were Secretary of the Interior and Mrs. Ray Lyman Wilbur; Assistant Secretary of the Interior John H. Edwards; Director Horace M. Albright; John D. Rockefeller, jr., and party consisting of Mrs. Rockefeller and sons, John, David, and Winthrop; Doctor and Mrs. McEwen; Executive Assistant Northcutt Ely; Thomas J. MacDonald, Chief of the Bureau of Public Roads, and many others.

DEDICATION OF ZION-MOUNT CARMEL HIGHWAY

July 4 the highway was formally dedicated in the presence of many distinguished visitors. The ceremony took place in the large gallery of the tunnel, known to engineers as No. 1. Speeches were made by Director Albright, who acted as master of ceremonies; B. J. Finch, district engineer of the United States Bureau of Public Roads; Thomas J. MacDonald, chief of that bureau; and the formal dedicatory speech by Gov. George H. Dern, of Utah. A male chorus of 30 voices from St. George, Utah, furnished the musical numbers and the beautiful singing was easily one of the features of the event.

TOPOGRAPHIC MAP OF THE PARK

A field party of the United States Geological Survey continued work on mapping the park. The work was speeded up greatly by using airplane photography. The field work will be completed this fall.

IMPROVEMENTS BY PARK OPERATORS

No extensive improvements were made by the Utah Parks Co., as their facilities appear adequate to handle present business.

BOUNDARY ADJUSTMENTS

On June 13 the President approved a bill which made substantial additions to the park along the east and south boundaries. The four important aims accomplished by this legislation brought the entire Parunuweap Canyon into the park, gave us control of the junction point with the Zion-Mount Carmel Highway of the proposed east rim road, extended the protected range of mountain sheep in this section, and put us in a position to purchase private lands near the south entrance, which are badly needed for future development in the park.

The area of the park was increased from 120 to 148.26 square miles.

PRIVATE LAND SITUATION

No land was purchased during the past year. The act enlarging the park took in approximately 560 acres of private land near the south entrance. We now have 666.85 acres in this area which should be purchased without delay. We already need this ground for expansion of our administrative area, and it will be impossible to develop the housekeeping unit in this park until suitable lands are purchased.

WINTER OPERATION

The Utah Parks Co. provided no service of any kind during the winter months, and there was very little demand for accommodations of any kind.

REGIONAL FOREST PROTECTION BOARD

During the year I participated in all activities of the regional forest protection board and also attended the interregional meeting at Portland, Oreg., in March. This is one of the most satisfactory contacts I have with officials of other Government bureaus.

ASSISTANCE OF PARK SERVICE OFFICERS

Again I have a deep feeling of gratitude to all my superior officers in the service for the help they have given me. Without such willing support the operation of any park would be impossible, and I feel that I have had even more cooperation than I have a right to expect from our field and Washington offices.

THE SOUTHWESTERN NATIONAL MONUMENTS

FRANK PINKLEY, Superintendent, Coolidge, Ariz.

TRAVEL IN GENERAL

Most of the southwestern monuments show an increase in travel attendance for the present travel year. Only two or three show a decrease. Travel to the 18 monuments (which includes Papago Saguaro for six months, it being abolished in April as a monument) amounted to 278,337 compared to 297,501 for 1929 and 257,966 for 1928. As visitors to these monuments are given personal guide service, the personnel has been kept very busy. There has been a fair percentage of people from foreign countries, and they are among our most appreciative visitors. Several of the monuments would have shown a greater attendance if road conditions had been good throughout the year. Aztec Ruins and Chaco Canyon, especially, lost considerable travel as roads were made impassable at times by heavy rains, and drifting sands. Gran Quivira and Montezuma Castle also lost attendance on account of bad roads. Travel to Petrified Forest was also considerably reduced on account of the Rio Puerco crossing being made impassable by high water at several different times.

Transportation companies have inaugurated passenger-bus service to take in several of the monuments. Harvey cars make regular trips into the Petrified Forest and the Indian detour service is taking in El Morro. We expect that this kind of service will soon be enlarged to take in more of the monuments.

The Director of the National Park Service and the superintendent of southwestern monuments made an inspection of the Papago Saguaro, Casa Grande, Tonto, Montezuma Castle, Petrified Forest, El Morro, Chaco Canyon, and Aztec Ruins National Monuments. The trip began at Phoenix on August 19 and ended at Gallup on August 27. After observing conditions in the national monuments and studying their problems, several important cities in Arizona and New Mexico were visited and important contacts made. The trip also included the Mesa Verde National Park. The chief landscape architect was in the party throughout the trip, and the superintendents of Mesa Verde and Grand Canyon National Parks and the custodians of the various monuments visited were with us part of the time.

MUSEUM AND EDUCATION

The following monuments have museum collections, which are housed in more or less makeshift structures: Aztec Ruins, Casa Grande, Chaco Canyon, Gran Quivira, Montezuma Castle, and Petrified Forest. A museum collection is also gradually being built up at Tumacacori. At each of these monuments the visitor receives personal guide service, the custodian being on duty the year round, with occasional ranger service through the busiest part of the season. Most of the exhibits are displayed on open shelves, and the artifacts are explained to the visitor by the custodian or ranger. This is considered a better method of "selling" the museum to the visitor than just depending on labeling of the exhibits. In spite of the open display of the specimens, stealage is so small as to be negligible. The exhibits are sometimes secured from private sources, if of more than usual interest, but ordinarily they have been excavated on the grounds in the vicinity of the museum. Visitors are especially interested in collections of this kind, and express their appreciation. No entrance fee is charged at any of the monuments. We are receiving good publicity from various sources and even receive inquiries from various foreign countries.

PAGEANT AT CASA GRANDE

An interesting feature during the year was the pageant given by the Arizona Pageantry Association on compound B on the evenings of March 28, 29, and 30. The cast numbered about 200, mostly students of the State's educational institutions. In addition to these there were Indians from the Hopi, Pima, Yaqui, and Apache Tribes. The stage lighting arrangement was very good. The pageant attracted over 5,000 people. Special trains were run from Phoenix and Tucson and some people came by plane.

Our local force of three men and an additional ranger, assisted by a small detachment of Arizona National Guards (Pima Indian troops), handled the traffic in fine shape, parking from 600 to 800 cars each night without the slightest mishap. Two border patrolmen helped us with the general police work. The pageant is an annual event and depicts various phases of the lives of the ancient people that once inhabited the places that now are ruins.

EXCAVATIONS IN NATIONAL MONUMENTS

An expedition organized by the Los Angeles Museum and financed by Doctor Van Bergen, of New York City, secured a permit to conduct excavations at Casa Grande. The expedition is in charge of Irwin Hayden, field archeologist. From the first of January until the middle of May they worked one of the older ruins on the north edge of the monument. Some interesting discoveries were made which will prove of great scientific interest and give more accurate data on the old civilization here. Work was suspended on account of the hot summer weather, and the expedition moved to the vicinity of the Navajo National Monument. They will return to Casa Grande in the fall to continue their operations.

Some interesting caliche pits were accidentally discovered in digging trenches for the new sewer line, and the expedition spent over two weeks on these, securing some interesting data.

A student class in archeology, under the supervision of Dr. Edgar L. Hewett, of the University of New Mexico, excavated several rooms at Chaco Canyon this summer. Very few artifacts were found and no important discoveries were made.

CONSTRUCTION, REPAIRS, AND MISCELLANEOUS ACTIVITIES

During the year just ended there was erected a ranger's residence at Petrified Forest, a custodian's residence at Tumacacori, and an addition to the custodian's residence at Montezuma Castle. A sewer system was installed at Casa Grande, which is believed to be sufficiently large to take care of all sewage at headquarters for many years to come.

Minor repairs on various buildings were made, and some road repairs at Capulin Mountain, Gran Quivira, and Petrified Forest. Trails were built and

repaired at Natural Bridges. The construction of a second ranger's residence at Petrified Forest had to be postponed until the private-land situation at that place could be cleared up. A station wagon for general utility purposes was purchased for Petrified Forest.

CAMP GROUNDS AND SANITATION

Camp grounds for tourists are maintained at many of the monuments. As funds permit these facilities are being improved and enlarged. We are working on a program of providing suitable toilet facilities for the public in the near future at the monuments showing the largest travel attendance. At present the only monument that has a sewage-disposal plant is Casa Grande.

WATER SUPPLY

There is an inadequate water supply at several of the monuments. At Petrified Forest the water problem has been temporarily solved by purchasing a truck and mounting it with a tank. A good supply of water is available from an artesian well 16 miles away from the headquarters, and water is hauled from there. A cistern was built for storage. A well will have to be drilled soon at Casa Grande as the water is unsatisfactory. We had poor luck at Chaco Canyon, drilling 400 feet without striking anything but very poor water.

ADMINISTRATION

Papago Saguaro was abolished as a national monument in April, reducing the total of the southwestern monuments to 17. These were administered by the superintendent, the chief clerk, 7 full-time custodians, 6 part-time custodians, 3 permanent rangers, 5 temporary rangers (2 since July 1), and a ranger-naturalist. The addition of 2 permanent rangers at Petrified Forest, 1 temporary ranger at Aztec Ruins, and 1 temporary ranger at Montezuma Castle gave a badly needed increase in personnel.

FUTURE PLANS AND NEEDS

A custodian's residence will be built at Aztec Ruins as soon as a suitable site can be secured, also public toilets, a water supply, and a sewer system. In order to have room for this construction, it will be necessary to acquire title to some privately owned property immediately adjoining the monument. A custodian's residence and a ranger's residence will be built at headquarters at Petrified Forest as soon as a clear title is obtained to a tract of land that has been chosen for headquarters area. Public toilets will be built this year at Casa Grande. Funds have been allotted for the above construction.

Our immediate future construction plans call for a roof over the main ruins at Casa Grande, two administration buildings (one at headquarters at Casa Grande, the other at Petrified Forest), employees' residences at Gran Quivira and Pipe Spring, and public toilets and sewage-disposal plants at Gran Quivira, Montezuma Castle, Pipe Spring, and Tumacacori.

Better roads are needed at most of the monuments if they are to serve the maximum number of visitors. More personnel also is needed at practically every monument.

TRAVEL ATTENDANCE BY MONUMENTS

Below are travel figures for the southwestern monuments:

Arches.....	400	Navajo	215
Aztec Ruins.....	12,906	Papago Saguaro (six months).....	50,000
Capulin Mountain.....	16,500	Petrified Forest.....	105,433
Casa Grande.....	36,656	Pipe Spring.....	8,765
Chaco Canyon.....	2,300	Rainbow Bridge.....	325
El Morro.....	3,500	Tumacacori.....	15,603
Gran Quivira.....	4,812	Wupatki.....	684
Hovenweep.....	400	Yucca House.....	240
Montezuma Castle.....	19,298		
Natural Bridges.....	300	Total.....	278,337

CRATERS OF THE MOON NATIONAL MONUMENT

R. B. MOORE, Custodian, Arco, Idaho

Craters of the Moon National Monument is 23 miles west of Arco, Idaho, on the Idaho Central Highway between Arco and Hailey. It is reached by way of Blackfoot over the Lost River Highway by travelers leaving Yellowstone National Park at the West Yellowstone entrance and from the west by leaving United States Highway 30 at Mountain Home or Idaho State Highway 24 at Shoshone. In 1930 the monument was visited by 7,365 persons.

The loop trip of 6 miles through the better-known portion of the monument leads past the Big Crater, where a terrific volcanic explosion rent a cavity in the top of a mountain a thousand feet deep and a quarter of a mile wide; the Crystal Pit, a volcanic aperture lined with sparkling stalactite formations, 110 feet deep and 60 feet wide at the bottom but opening in a narrow outlet through which come strange air currents from underground; ice caves and water holes where water remains at a temperature of 2° above freezing exposed to the sun on the hottest days of summer; and other craters, caves, cinder beds, lava streams and floats, and interesting rock formations.

The automobile road from Blackfoot is 58 miles of oiled surface highway to Arco and 23 miles of graded and gravel highway from Arco to the monument. The oiled road was constructed in 1930.

MUIR WOODS NATIONAL MONUMENT

WILLIAM J. THOMAS, Acting Custodian, Mill Valley, Calif.

The 5 miles of beautiful trails in the Muir Woods National Monument were kept in perfect condition, the sides being protected by barbed wire where necessary to prevent undermining by short cuts. Much was done to protect the stream from washing out the soil, thereby undermining the growths along its banks.

Though the monument for the most part is in excellent condition, there are several urgent needs. The most important is the grubbing out of old brush that gets thicker every year, thereby increasing the fire hazard. The damage therefrom would be irreparable, as many fine and rare trees would be demolished or badly scarred. The National Park Service has furnished in July of this year a first-class gasoline pump with 1,500 feet of 1½-inch fire hose, nozzles, and equipment, but the ideal prevention of fire is keeping things clean of debris, thus adding with the same stroke to the beauty of the park. This is very important for the instruction and pleasure afforded.

Another matter of importance is the addition of another comfort station such as was built in 1928. The old privies throughout the place should be torn down or completely renovated as they are dark and insanitary in the extreme.

A topographic or other map designating trails and points of interest would be of great benefit. Visitors coming in have very little idea of what to expect or of the delightful and very easy walks abounding, and a great deal of time is given by the custodian pointing these out.

Two curiosities have been found recently in the monument. One is an albino redwood struggling for existence, another is a stunted growth of redwood very much of cactuslike growth. These two are very unusual and very interesting, and have been protected by a wire fence.

Landscape Architect Sager has suggested that one of the trails be called "The Nature Trail," and all the plant life thereon be marked by their proper names, and that the age, height, and circumference be marked on two or three of the most prominent redwoods to avoid guesswork on the part of the guide.

REPORT OF CIVIL ENGINEERING DIVISION

FRANK A. KITTREDGE, Chief Engineer, San Francisco, Calif.

The primary service rendered by the engineering division of the National Park Service has been to obtain facts concerning physical conditions and to develop those facts on paper so that they may be readily used. It has been part of our service to calculate in advance the cost, and in many cases, to

determine so far as may be possible the future utility and practicability of many of these projects. In its relationship to the future the whole structure of park development is more or less dependent upon a knowledge of these natural conditions which can best be ascertained through careful engineering studies.

The undertaking is a large one; the results are far-reaching, because this information used by administrative officers is the foundation structure largely limiting or determining the future usefulness of our national parks and their possibilities of development and conservation. So far as has been possible with our limited field and office force we have determined facts concerning a few of the most important problems now up for solution. It is largely through information thus obtained that roads and trails and buildings and all other park development can be rightly located, constructed, and maintained. It is through such information that power plants, water supplies, and sewage systems can safely be constructed and developed without fear of early abandonment.

The division has worked in closest cooperation with the park superintendents, the landscape architectural, educational, and forestry divisions, and other Government agencies, particularly the Bureau of Public Roads and the Public Health Service.

ORGANIZATION

The engineering work is being largely coordinated under the chief engineer at field headquarters. Except in a few of the parks where there are resident engineers the engineering division of field headquarters, at the request of the various superintendents, is furnishing practically all the engineering personnel. The associates and assistant engineers have been selected with care. It is not enough simply to be an engineer and to have outstanding ability, skill, and experience. They must be willing to cooperate and they must be tactful and versatile. Before leaving this office for work in the parks they are thoroughly instructed in park standards and requirements, and throughout the season their work is constantly under the closest possible direction and supervision of the park superintendents and field headquarters.

They are employed on field work during the season when efficient work in the parks is possible and in the winter months are called into field headquarters, where sketches, plans, maps, designs, and cost estimates are made and careful plans laid for the seasons to follow.

In connection with the work above outlined it has been our desire, only partially realized, to have a complete and accurate unit construction cost of every project, whether the construction has actually been done under the supervision of our field engineers or otherwise. With this cost information we can determine with a reasonable degree of accuracy the future construction estimates necessary for compiling the annual Park Service budget. In this way we hope for the greatest efficiency and economy.

The landscape, educational, engineering, and forestry divisions of field headquarters and the Public Health Service are dealing largely with the same problems, but from different angles. The work and plans of each of these organizations is dependent to a more or less degree upon the work and plans of each of the others. In order that a comprehensive decision may be reached it is vitally important that the facts be developed by engineering studies as far in advance as possible and that tentative programs be established in order that due consideration may be given to the suggestions and plans of each of the other organizations interested.

Compared to the vast amount of work to be done in this field, little has yet been accomplished, but steady and efficient progress is being made. The ground work has been laid, a general outline completed, and it remains now to work as time and means will permit to secure the facts necessary in the solution of many park problems.

Our personnel, both in the office and in the field, while efficient, is not sufficient in numbers to do all the work necessary to be done at this time. Frequently the study of facts concerning projects is postponed and reports and even correspondence delayed for lack of sufficient help. In some cases actual designs have been delayed and field construction and purchases of equipment so postponed that they have resulted in actual financial loss to the Government.

CONSTRUCTION PROJECTS

Our space in this report will permit mentioning only a few of the many engineering problems with which the Park Service is confronted. The number of projects urgently requiring engineering study is far greater than ordinarily thought. These problems demand study by men skilled in practically every line of engineering.

ROADS AND TRAILS PROJECTS

Of the \$5,000,000 authorized or appropriated for roads and trails for national parks, approximately \$1,000,000 are expended on minor projects and equipment. This fund is expended upon needed improvements in approximately 22 national parks and monuments.

MINOR PROJECTS

Under this program are included a great many individual projects, a few of the larger ones being as follows:

Crater Lake:

Rim Road betterments.....	\$30,000
Scenic trails to Garfield Peak and other points.....	15,000

Glacier:

Continuing construction of trail system.....	40,000
Post construction.....	10,000
Oiling of entire Glacier Park main highway system and general clean-up along roads.....	25,000

Grand Canyon: Construction of Bright Angel Trail..... 20,000

Grand Teton: Beginning of construction of road and trail system.... 40,000

Lassen Volcanic: Construction of trails and reconstruction of bridge and post construction of roads..... 20,000

Mesa Verde: Construction of roads and trails to the various cliff dwellings and rims (great care has been exercised to preserve the natural landscape)..... 22,000

Mount Rainier: Oiling and post construction of roads, construction of parking areas, continuation of trail systems and footpaths, etc... 77,000

Platt: Improvement to park roads and also paving with concrete and asphalt part of the city streets, a section of which is within the park..... 15,000

Rocky Mountain: Post-construction, oiling of highways, and construction of subsidiary roads and the continuation of construction of the trail system..... 56,000

Sequoia: Construction of camp roads, subsidiary roads, post-construction of highways, and construction of the High Sierra and other trails, totaling over..... 62,000

Yellowstone: Highway construction, including main highway improvement, betterments to eliminate dangerous sections of roadway, the oiling and semiprocessing of many miles of the main highways, over..... 140,000

Devils Tower: A new bridge and approaches recently constructed by the Park Service required heavy reconstruction costs on account of devastating floods. A system of channel changes and river diversion works, all planned and designed by this office, are under construction. Under the plan as worked out, it is hoped that not only will adequate construction be had at a much less cost than ordinarily approved rigid river diversion types, but that also the old channel may be backfilled by the river's own action through proper guidance. If this can be accomplished it will not only effect a protection to the bridge and roadway at a very great saving in cost but also will improve the appearance of the areas devastated by floods.

Many park day-labor projects are not mentioned herein for lack of space.

Minor construction by park day-labor forces comprises approximately 148 separate projects. There were made approximately 80 surveys, topographical surveys, and surveys of individual projects, the construction of which cost as much as \$145,000.

MAJOR PROJECTS

The Bureau of Public Roads, at the request of the Park Service, is handling the survey and construction of major projects. These funds are being expended on approximately 43 projects either now under construction or preparatory for construction, and approximately 15 survey projects for next year's activities.

Between three and four million dollars have been allotted to major road projects. All steps prior to turning over to the bureau are handled by Park Service officials.

PHYSICAL IMPROVEMENT PROJECTS

There are at this time over 133 physical improvement projects under construction, each of which call for extensive engineering effort. The following partial list gives some idea of the great variety of work coming up for solution:

Carlsbad Caverns.—Construction of a water-supply system. Driving a shaft 750 feet deep in cavernous solid rock, and the installation of a passenger elevator with power and hoisting equipment which will safely carry the thousands of persons from the depths of the cavern to the surface.

Crater Lake.—A water-supply system, a sewage-disposal system, construction of the Sinnott Memorial, and building employees' residences.

Glacier.—Construction of several buildings and construction and equipment of camp grounds with water and sewage facilities.

Hot Springs.—Building adequate storage reservoirs and reconstructing the entire water system of the Hot Springs to supply the necessary water for the multitudes who come to the Hot Springs for health purposes, for which an appropriation of over \$140,000 has been made.

Mesa Verde.—The construction of buildings, telephone lines, and the drilling of a deep well. This well will be one of the deepest water wells in existence and it is estimated that a depth of 4,000 feet will have to be reached before adequate water will be made available. It is quite possible also that gas may be encountered en route, and preparations are being made to take off and use the gas for fuel purposes (if encountered) in a pipe surrounding the water pipe.

Craters of the Moon.—A new water system is being developed costing approximately \$19,000.

Mount Rainier.—An entirely new and complete development is under way in the Yakima Park area. This development constitutes the construction of a dam for impounding water, constructing several miles of high type water pipe line, construction of water distribution systems, construction of sewer lines and septic tanks, grading several miles of roadway, construction of trails and footpaths, the paving of footpaths, the construction of buildings, and the grading of parking areas, and areas on which buildings will be constructed. Also very careful studies are being made pertaining to the relative merits of different types of power development; that is, by use of Diesel power or commercial power brought in from a great distance. Also the matter of increasing the water supply by pumping from various springs at a lower altitude is a subject of thorough investigation.

Wind Cave National Park.—Much needed public utilities, such as a sewage disposal system, piping water from a considerable distance, the lighting of caverns, and the construction of buildings.

Yosemite National Park.—The great variety of projects includes construction of residences, apartment houses, comfort stations, extension of electric systems, telephone system, and water-supply system. Also included construction of a new sewage-disposal system, with extensions, amounting to about \$140,000; complete reconstruction of the trestle system supporting the water conduit from dam to power house; and development of camp grounds and many other lesser projects.

Zion Park.—The floods in Zion Valley have during the last few years reached a point where the actual damage has accelerated rapidly. This year combined funds amounting to over \$30,000 have been allotted to the confinement of the river to a safe channel. Rather unique types of basket diversion dams have been used. Floods have already occurred since their construction and they have operated satisfactorily to prevent further erosion of the precious valley lands and the lands occupied by roads and buildings. The value of savings in lands and utilities can not be estimated in dollars alone.

Many other physical-improvement projects of all kinds which require engineering planning and close engineering supervision are not mentioned in this report.

In addition to the advance planning and engineering during construction complete estimates of cost and bills of material covering all of the multitude of buildings, sewers, water systems, elevator, dams, etc., have been made.

SUMMARY OF CONSTRUCTION

Number of minor or day labor projects, roads and trails projects, construction, 148, surveys 80.

Number physical-improvement projects, construction 133. Approximate total number of projects, 361.

Total fund available for minor roads and trails projects, physical-improvement projects, surveys and engineering supervision and equipment, approximately \$2,200,000.

Number of major or bureau road and trail projects, construction 43, surveys 13, total 56.

Total fund available for major road and trail construction, survey and engineering supervision, approximately, \$3,600,000.

EQUIPMENT PURCHASES

We have made extensive purchases for practically all of the parks. In this connection it was necessary to make careful estimates of costs before appropriations or allotments were made. In practically every case, bids were circulated to a large number of prospective bidders. Wherever possible, careful and thorough study has been made to determine the most modern and efficient machinery on the market. We have endeavored in all cases where possible to comply with the suggestions and requests of the superintendents in respect to certain lines of equipment, while at the same time complying absolutely and strictly with the terms of our specifications, carefully drawn to secure the greatest possible utility and coordination with superintendents' wishes and ability to stand hard usage over a period of years. Purchases and shipments have been made in the largest possible combinations, thus securing large transactions and the least possible number of contracts and orders and thus delivered at the least possible expense to the Government.

During the period from January 1 to July 31, 1930, the following transactions were carried on through the purchasing division of field headquarters: Total specifications written or revised, 328; bid sheets written, 162; total sheets written, 490; specification stencil sheets, 378; bid sheet stencils, 162; total stencil sheets made, 540; total sheets mimeographed, approximately 21,000; total number contracts, 134; total number orders without contracts, 198; total number purchases, 342.

During this period there were purchased for the parks, at the request of the superintendents, supplies and equipment amounting in the aggregate to \$278,000.

Except in a very limited number of cases, deliveries were made promptly and on time, in accordance with contract. There have been certain delays in submitting projects for proposals which were unavoidable on account of shortage of stenographic assistance.

In all cases prompt payments were made and discounts saved, through which means alone a net saving was made to the Government of \$1,000. The amount of cash saving made on account of keen competition, combined purchases, factory delivery, in larger quantities, and freight shipment in larger quantities is, of course, indeterminate.

We believe that probably the largest savings in the central purchasing of equipment are rather intangible. We realize that standard equipment may be purchased with much less effort than is now being exerted in the preparation of specifications, but by the careful analysis of equipment and the writing of the specifications to eliminate all light equipment we are able to purchase only that which appears to be of a type and sturdiness which will withstand the very exacting requirements of the national parks. The lighter trucks, which are entirely satisfactory for paved roads of the country, are eliminated because they would not stand up under the rough surfaces and steep grades of our secondary roads.

Also, by the confining of purchases—as in the case of trucks—a large saving is accomplished in the stenographic and clerical forces in this office, the Washington offices of the Park Service, the Secretary, and the Comptroller. For example, we have purchased 59 trucks this year under 20 contracts. These purchases cover 32 orders from the superintendents. Thus the central purchas-

ing at San Francisco has made it possible to accomplish the result in 20 contracts instead of 32, which would have been necessary if purchased by the parks.

Next year the earlier knowledge of what equipment is to be ordered will make possible further computing of orders and fewer contracts.

GENERAL

Several matters of engineering policy, which the director has inaugurated, have resulted in much gain to the development and serviceability of the parks.

The augmentation of the trail program to the present fair proportion is making it possible for all who desire to reach the wilderness areas to do so in comparative comfort, either on foot or horseback.

The very large purchases of equipment are helping to put the park construction activities on a modern basis and have resulted in accomplishing infinitely more work than could otherwise have been done with funds available.

The embodiment of educational, landscape architectural, Public Health Service, and administrative advice in all engineering projects where they are involved respectively have, we feel, resulted in the most complete and well-rounded plans and construction to meet the peculiar Park Service requirements. Furthermore the closeness with which the engineering and superintendents' organizations are working together enables the most efficient result.

The oiling and oil-processing of park highways and trails is revolutionizing the appearance of the landscape and the comfort with which tourists may visit the parks. The elimination of dust has tremendously improved the comfort of tourists and the safety of traffic. The director's policy in oiling matters has resulted in savings to the traveling public and in good will toward the Park Service many times its cost.

REPORT OF LANDSCAPE ARCHITECTURAL DIVISION

THOS. C. VINT, Chief Landscape Architect, San Francisco, Calif.

GENERAL STATEMENT

The work of this division deals with landscape and architectural design. It is the professional advisor to the service in matters pertaining to landscape architecture and architecture. The office at San Francisco operates much like the usual professional landscape office except it has the ideal condition of having park superintendents for clients.

The work in each park involves, first, a logical well-studied general development plan. Within that a general plan for each tourist center in the park, and the plan of the general highway system connecting these centers form the two main divisions of the general park plan. In these problems the protection of the natural landscape; the location of buildings, bridges, and grading work; the selection of types of architecture; and planting programs to restore natural planting that has been destroyed, make the problems of our everyday work which must be fitted into the main development plan.

The enlarged road program, involving the initiation of a greater volume of new projects under the Bureau of Public Roads, was handled smoothly and with few delays. Our plans for park building projects were prepared more completely and with fewer delays than in former years. A greater percentage of sketch plans for work contemplated a year in advance were prepared than formerly. The field work was covered more completely and more uniformly than before.

The park operators did less building than usual. Only three large projects were undertaken by them, but nearly all of them built some small improvements, and finished work begun the year before. The work done this year, though relatively less in volume, was work of completing and finishing and was more far-reaching in a landscape way per dollar spent than the dollar spent in usual years.

The study and acceptance of Standards of Housekeeping Cabins by both the Government and park operators will have a far-reaching effect in future development work of the operators. This has already shown its effect on future work under consideration and may be considered as the outstanding note of progress for the year.

This year—through the accumulation of completed work of several years' road construction—marked the time when the effect of park landscape requirements in road construction plainly showed the contrast to other work. It is the year the results of our efforts on the road program became apparent to the average visitor.

PERSONNEL

Three new positions were authorized during the year and one position was reallocated to a higher grade. This gives us authority for 2 associate landscape architects, 5 assistants, and 4 juniors. At present 1 associate, 1 assistant, and 1 junior are on probational appointments and 2 juniors are under temporary appointments. We have not only a larger personnel to start a new year but a greater percentage of permanent employees than heretofore. We have gained in our personnel problems during the year and hope within another year to have all authorized permanent positions filled.

The turnover of temporary employees was slightly less than that of the previous year. At the close of this year we have four new men in the organization who are eligibles. Two of these are relieving men who have been performing good work under temporary appointments but failed to qualify under the Civil Service.

It is important that the Civil Service hold examinations for our positions in the near future in order to fill vacancies and to have a small list of available eligibles.

OFFICE WORK

This work is largely a drafting-room job. All field men are brought to the San Francisco office when not required in the field. This procedure has proven very satisfactory as when the men follow a plan through the process of preparation they are familiar with the purpose of all features of it, and this makes them better able to carry out the intent of the plans in the field.

The office work consists of the preparation of plans and the review of plans which are prepared by others.

The work is divided into two general classes: One covers items within the regular park appropriation and the construction done by the park operators or the work done directly by the superintendents' organizations. The other covers work done under the road appropriation or work done through the Bureau of Public Roads.

General plans were prepared for the Yakima Park area at Rainier National Park, the Mammoth Springs area at Yellowstone Park, and the headquarters areas at Petrified Forest and Casa Grande National Monuments.

Building plans make the largest volume of our drafting-room work. This year there was a larger construction program than usual in the parks. We were able to prepare more complete working drawings than formerly and completed them more nearly on schedule. On the whole there were no conspicuous building projects; residences, ranger stations, checking stations, shop buildings, and comfort stations made up the list. There were a number of interesting shelter cabins and fire lookouts. Plans were prepared for two museums, one on Victor Rock at Crater Lake, which is a memorial to Congressman Sinnott, the other a wayside museum at Grand Canyon.

Studies and sketches were prepared for building programs for the southwestern monuments. These form the beginning of a number of very interesting problems which will continue over a number of years. The development of these monuments has been neglected until now, and we feel the service is committed to bringing them up to the standard of development of the parks.

Plans were prepared for a customs and immigration building at Babb-Piegan, Mont., for the Bureau of Customs. It is to be located on the Glacier Park to Canada Highway. The Customs Service desired that the structure be designed in keeping with the park buildings, and requested the Park Service to prepare the plans. The construction will be carried on under the Supervising Architect in the Treasury Department.

Sketch plans were prepared for structures projected for the 1932 construction program. We made a gain in this work of sketch plans for the Budget estimates but did not make them for the entire program. We hope to come nearer that goal in the coming year.

PARK OPERATORS' CONSTRUCTION PROGRAM

The park operators' program as a whole was a limited one. The uncertainty of business conditions throughout the country made it expedient for them not to extend their facilities. From the park viewpoint this was fortunate and valuable. It gave an opportunity to take up loose ends. Most operators completed many little things around their places which were effective toward giving them a finished appearance. Most important, the breathing spell has given the operators an opportunity for reflection. They have appraised and analyzed what they have done and are thinking out their next move. This will result in more logical programs in the future.

The Rainier Park Co. built an entire new housekeeping cabin camp at Paradise Valley, which consisted of a large building to contain a cafeteria, store, etc., and 275 cabins. In the Yakima Park area this same unit was duplicated with the exception that accommodations for other classes of travel are provided for within the same unit.

The Yellowstone Park Hotel Co. built an addition to the Canyon Hotel. This is the only large hotel project of the year.

The Utah Parks Co. built a housekeeping camp at the north rim.

The outstanding note of progress in park-operator development was in the field of housekeeping cabins. The director appointed a committee to study standards for these units. The park operators did the same through a committee and individually. Whereas there are differences of opinion, on the whole there is a better understanding of the needs of such facilities.

These studies affected other units as well as housekeeping cabins through an analysis of the effect on other units due to this new type of development. In this way the question developed a great deal of thought on the development of all tourist facilities. The benefits will bear fruit in all future programs.

BUREAU OF PUBLIC ROADS

The year's work with the Bureau of Public Roads was very successful and went smoothly. Many new projects were initiated during the year, due to the increase in road appropriations. The procedure of operation developed and made for greater efficiency. Surveys were inspected with bureau engineers more regularly, which made for less revisions in plans submitted for approval, and the increased volume of work was handled with less effort than expected.

The results of the establishment of a systematic routing of plans through our own office which was begun a year ago showed marked results.

One outstanding feature of this year's work was that through the accumulation of completed work of the past several years there was enough in each park to show what is being done in the park road program. It is the first season that a distinct contrast between park roads and other roads was apparent to persons not connected with the work of building the roads. The efforts toward the protection of the roadside and the natural landscape are showing.

Last year our step forward in our work with the bureau was a general revision of the specifications covering landscape features which included the adoption of type "B" excavation. At the close of the year sufficient work had not been completed to test the revised specifications and the use of type "B" excavation. Work accomplished this year under these provisions has proven their worth. The results accomplished are the real test, yet it is noteworthy that their acceptance by engineers and contractors was accomplished with little effort. Further, the bid prices were not as high as expected and, finally, they have made for a proper understanding of what is desired.

Six major bridge projects were begun during the year and two completed. The centralization of bridge design for all parks by the Bureau of Public Roads at San Francisco has facilitated this work. It permits collaboration between the architects and engineers during all stages of the preparation of plans.

TRAVEL AND FIELD WORK

Our season for field work is the construction season, or from May to November, for most parks. Some of the southern parks have an all-year construction season.

Assistant and junior landscape architects are assigned to one or more parks for the construction season. Our field assignments for this year were more

closely related geographically and the assignments covered the parks more comprehensively than heretofore. They are as follows:

1. Rainier and Glacier.
2. Crater Lake, Lassen Volcanic, Sequoia, Muir Woods, Pinnacles.
3. Yosemite.
4. Grand Canyon, Zion, Bryce Canyon.
5. Rocky Mountain, Mesa Verde, Hot Springs, Platt, Carlsbad Caverns, southwestern monuments.
6. Yellowstone, Wind Cave, Devils Tower, Craters of the Moon.

As the year closes one field man is being transferred to an assignment in the East. He will cover George Washington Birthplace National Monument, the proposed Colonial National Monument, and the Great Smoky Mountains National Park (proposed). This will leave us short-handed as we have no one ready to take over his work in the West. We find that a year of service is necessary before a man can be given a field assignment. We will divide his territory and add to those adjoining it.

During the year most of the superintendents requested more time of the field men than we were able to give. We covered the ground more thoroughly this season and there was a greater demand for our services. The tendency is toward having a landscape architect for each park. To obtain proper results one park's landscape problems are sufficient for all of one man's time.

My own travel this year took me farther afield than usual. Trips were made to Mount McKinley Park and Sitka Monument in Alaska, and to Hawaii National Park in Hawaii. On a trip to Washington, D. C., I included a trip to the proposed Colonial National Monument in Virginia.

In making a trip to the major western parks this season I traveled by automobile. Although this means of travel is more tiring physically it proved of value professionally. It gave me a different perspective of the needs of park travel and this is important as the majority of park visitors travel this way.

I covered two assignments to inspect areas proposed for national parks. One trip of eight days was made in the Wallowa Mountains in Oregon, another of four days in the Bad Lands of North Dakota.

An outstanding field problem this year was a collaborative study of the plan for Mammoth Hot Springs in Yellowstone Park with Maj. Gilmore D. Clarke, landscape architect for the Westchester County Park Commission, of Bronxville, N. Y. Mr. Clarke represented a committee of the New York Chapter of the American Society of Landscape Architects who have been studying this problem with us. Mr. Clarke visited Yellowstone Park during the month of June. He made a thorough study of the problem on the ground and prepared a plan which has been submitted to the director and is now being carefully studied.

A landscape study was also made of the Rocky Mountain National Park region for the purpose of working out the final boundaries to be recommended for the park. Major Clarke, Charles W. Elliot, 2d, of the National Capital Park and Planning Commission of Washington, Director Albright, Superintendent Rogers, Assistant Landscape Architect Peterson, and the chief landscape architect made this study. Consideration was also given to the means necessary to restore natural conditions.

REPORT OF FIELD EDUCATIONAL DIVISION

ANSEL F. HALL, Senior Park Naturalist, Berkeley, Calif.

During the year ended September 30, 1930, a far larger proportion of park visitors was served by the educational staff than in any previous year. The year has been marked by the continued interest and participation of a number of eminent scientists and educators acting in an advisory capacity, assisting in the formulation of general principles and plans underlying the development of more complete educational service in the parks.

INCREASE OF THE EDUCATIONAL FIELD STAFF AUTHORIZED

During the past year new permanent park naturalist positions were authorized for Crater Lake, Lassen Volcanic, Grand Canyon, Rocky Mountain, Zion, and Mesa Verde National Parks and the southwestern monuments. Authorization was also secured for a raise in grade for the park naturalists of Yosemite,

Yellowstone, Sequoia, and Mount Rainier National Parks. The position of park naturalist for Hawaii National Park is still filled in a temporary capacity, in view of the fact that no eligibles have as yet passed the civil-service examination.

TRAINING OF PERMANENT EDUCATIONAL STAFF

In November, 1929, all permanent park naturalists were given one month of training at the chief naturalist's office in Berkeley, Calif. During this period the principles underlying the educational activities in the national parks were thoroughly reviewed, and a detailed study was made of methods of presentation of lectures, conducting of field trips, display of exhibit material, writing of publications, research, etc. Especial attention was devoted to museums and museum technique under the direction of Field Naturalist C. P. Russell and cooperating technicians from the California Academy of Sciences and the Museum of Vertebrate Zoology.

Arrangements were made for broadcasting of daily talks by the park naturalists during the entire training period.

ADMINISTRATIVE PLANS PREPARED BY EDUCATIONAL DIVISION

Continuing the planning activities reported for the year of 1929, in cooperation with the park naturalists and park superintendents, plans of administration were completed for the educational activities of all national parks in which such work is conducted, except Zion. Several of the plans prepared during the past two years were revised and brought up to date, and the field organizations are reported as functioning smoothly under these outlines of operation.

DEPARTMENT OF MUSEUM PLANNING AND TECHNIQUE

On July 1, 1929, Carl P. Russell, formerly park naturalist for Yosemite National Park, was appointed field naturalist and assigned to the special field of museum planning and technique. Due to the important museum development projects in Yellowstone National Park the greater part of Field Naturalist Russell's time during the past year has been devoted to Yellowstone problems. Three months were spent at Brown University, Harvard University, the Geophysical Laboratory, the headquarters of the Geological Survey, and other institutions in the East, preparing mineralogical and petrological data for use in Yellowstone.

A large proportion of the summer of 1930 was devoted by Senior Park Naturalist Ansel F. Hall to the planning and installation of exhibits at Yavapai Point Observation Station and Museum in Grand Canyon National Park.

Based upon experience during the past year it is evident that more technical assistance should be provided in the field of museum planning and installation.

PHOTOGRAPHIC DEPARTMENT

The photographic department was established early in 1929, and activities have been carried on the greater part of the past fiscal year through the contribution of private funds by a friend of the parks.

During the field season of 1929, Photographer George A. Grant made photographs of the chief scenic features and points of educational interest in a number of the national parks and monuments. Approximately 2,600 negatives were on hand at the end of the season. During the winter of 1929-30 approximately 15,000 prints were produced in the photographic laboratories at Berkeley, and approximately 1,900 lantern slides were made.

During the field season of 1930, Photographer Grant spent one month at Grand Canyon, completing photographs for the educational projects in that park. The remainder of the season was spent in making negatives of the scenic and educational features of Rocky Mountain and Grand Teton National Parks.

INCREASED SERVICE TO THE PUBLIC

In all parks the current service to the public has greatly increased during the past year despite the fact that the field staff has not been materially enlarged. The chief factors responsible for the great increase of individuals taking advantage of field trips, lectures, and other educational service seem to be the

increasing desire on the part of the public to understand the parks more thoroughly. Another factor which seems to have made the educational service more effective is the better distribution of information relative to the service offered. This is particularly noticeable in Yosemite National Park, where 17,062 persons were taken on field trips by ranger naturalists during the three summer months, an increase of 61.5 per cent over the previous year. During the same period the attendance at lectures was 160,422, an increase of 92.5 per cent over the previous season.

GUIDED FIELD TRIPS

As in past seasons, the educational staff offered guided walking trips in each of the parks where educational activities are under way. In each region attention is concentrated upon the most important phenomena of the particular park involved. Thus, in Yellowstone the thermal phenomena are interpreted at the Geyser Basins and at the Mammoth Hot Springs region, while at other points the wild life can best be shown and explained. In Yosemite National Park the geological and biological phenomena form the basis for nature walks. The past year additional daily walks to more distant scenic viewpoints on the valley rim were announced. These full-day walks proved to be immensely popular, the average attendance for the 42 trips conducted being 41 persons.

In the absence of an educational staff, a full program of field trips and lectures was offered by the regular ranger force in Rocky Mountain National Park, and the splendid results achieved are to be especially commended.

AUTO CARAVANS

In August, 1929, Park Naturalist Harwell, of Yosemite National Park, tried the experiment of conducting a group of visitors in their own automobiles to the points of greatest geological interest in Yosemite Valley. This new type of service proved to be so popular that during the season of 1930 daily trips have been regularly scheduled and large numbers of visitors have taken advantage of this new type of service.

Automobile caravan trips were also successfully inaugurated in Yellowstone, Sequoia, and Grand Canyon National Parks.

LECTURES IN THE PARKS

The lecture service in the national parks has been greatly extended during the past year and a far greater number of visitors has been served than ever before.

In Yosemite National Park the lecture service of former seasons has been greatly extended. Instead of one lecture per day on the geology, six lectures per day were scheduled at the museum, and additional service given on request. The nightly lecture at the bear-feeding grounds, which had formerly been delivered by an employee of the Yosemite Park & Curry Co., was taken over by the National Park Service and delivered each evening by the park naturalist.

In Sequoia National Park the evening campfire lecture was continued as during past seasons, but additional service was provided in daily lectures at the base of General Sherman Tree and at Bear Hill.

MUSEUMS IN THE PARKS

Grand Canyon.—In Grand Canyon National Park the Yavapai Point Observation Station and Museum has been brought to completion by Senior Naturalist Hall, working in cooperation with the park naturalist and superintendent, under the general direction of Dr. John C. Merriam, who planned and secured the funds for this most important development. The story of the Grand Canyon is clearly and concisely told by means of exhibits and telescopes and field glasses erected to show points of special geological significance in the canyon.

Under the direction of Mr. Harold Gladwin, of the Gila Pueblo Museum, a large Pueblo Indian ruin near Lipan Point was excavated during the summer of 1930 and prepared for exhibition. Plans were drawn for a small museum, which is being erected at this point as a contribution of Mrs. Winifred MacCurdy.

Under the direction of Park Naturalist McKee the old administration building was converted into a general museum, where a few exhibits are displayed and

facilities provided for the storage of important study collections which can not be housed at Yavapai station.

At north rim one large room in the Grand Canyon Lodge has been made available through the courtesy of the Union Pacific, and is utilized as a temporary museum. The exhibits installed pertain chiefly to the geology of the Grand Canyon and to the flora and fauna of the Canadian Zone, which are characteristic of the Kaibab Plateau.

Yellowstone.—During the past year the exhibits at the general museum at Mammoth have been greatly augmented and a complete new arrangement has been put into effect under the direction of Field Naturalist Carl P. Russell and Park Naturalist Dorr G. Yeager, working in consultation with Dr. Hermon C. Bumpus.

The new museum at Old Faithful specializes on the interpretation of the thermal phenomena of the park and has functioned perfectly during the past season.

A new branch museum was completed at Norris Junction. In the two exhibit rooms in the foyer are exhibits on the petrology, geology, chemistry, volcanism, and physiography of the Yellowstone region, and ecological bird groups are introduced in connection with the latter exhibits.

At Madison Junction a small museum was completed and exhibits were installed which interpret the history of Yellowstone up to and including the establishment of the national park.

Another branch museum was planned and is being constructed at Lake Yellowstone.

Lassen Volcanic National Park.—The museum established through the generosity of Mr. and Mrs. B. F. Loomis was of interest to visitors during the year.

Mesa Verde National Park.—In Mesa Verde National Park the archeological museum was enlarged by the erection of additional units and the installation of especially important exhibit material recently excavated. The quality and scope of the archeological exhibits shown make this little museum one of the most important in the United States in its specialized field.

Yosemite National Park.—The Yosemite Museum continues to function with extraordinary success as a center of educational activities. An interesting new development was planned and carried into effect the past season under the direction of Park Naturalist Harwell. In the open area in the back of the museum an exact replica of one of the early Indian camps was established and arrangements were made for an old squaw to occupy the camp daily, demonstrating the weaving of baskets, preparation of foodstuffs, singing of Indian songs, etc. This "live exhibit" proved to be of great interest to Yosemite visitors.

Hawaii National Park.—The Uwekahuna Museum and Observatory continued to function as a most important feature of the educational program.

Zion National Park.—Through the enthusiastic efforts of Acting Park Naturalist Angus M. Woodbury the collections of the Zion museum were greatly augmented during the past season. So much material has been secured that it is impossible to display all exhibits in the small building which is available. There is vital need for a larger museum in this park in the near future.

Glacier National Park.—Museum exhibits were collected by Park Naturalist George C. Ruhle and temporarily installed at Many Glacier. Since no Government building is as yet available as a museum, the educational activities in this park are being conducted under difficulties.

Sequoia National Park.—The extensive collections built up by former Superintendent Walter Fry, are still housed in the temporary museum building at Giant Forest. Due to the limited space and the fact that the building is not fireproof, it is essential that efforts be made as soon as possible to secure an adequate fireproof museum building for Sequoia Park.

Crate Lake National Park.—Museum collections were installed in the community building at the rim during the seasons of 1929 and 1930. A large proportion of the park visitors was reached at this contact point, which also serves as headquarters for the educational staff.

On July 1, 1930, an appropriation was made available by Congress for the construction of the Sinnott Memorial Observation Station and Museum, which will be built on Victor Rock, close to the center of activities at the rim. Plans for this building were developed by the landscape division and reviewed by the educational division and by Dr. John C. Merriam, chairman of the secretary's advisory committee. Construction started during the fall of 1930.

Mount Rainier National Park.—During the seasons of 1929 and 1930 a temporary museum was established by Park Naturalist Brockman in the community building at Paradise. This was visited by a large proportion of the automobile campers but is somewhat remote from Paradise Inn and therefore reaches a smaller proportion of those who stop at the latter point.

The small park museum at Longmire was operated continuously during the entire year. The limited space, however, prevents needed development, and a permanent museum building is vitally needed.

Rocky Mountain National Park.—During the past season certain museum exhibits have been displayed at park headquarters. Provisions for expansion in this field are being made by the construction of an information station and museum building which is being erected at park headquarters in Estes Park, through an appropriation made available July 1, 1930. Superintendent Rogers has received substantial contributions from organizations in Denver which will take care of the installation of natural history exhibits as soon as the building is completed.

Grand Teton National Park.—During the season of 1930 a very creditable temporary exhibit of local fauna and flora was maintained by Acting Park Naturalist Fryxell. No quarters are available, however, and a museum building is vitally needed as headquarters for developing educational activities.

EXHIBITS IN PLACE AND NATURE TRAILS

During the past year experience has proved the importance of labeling exhibits in place, and this field is rapidly being developed in a number of the parks. In Grand Canyon National Park trails are being constructed to localities where particularly important fossils are to be found within the canyon.

In Yellowstone National Park a small structure has been erected at Obsidian Cliff and exhibits installed to tell the story of the formation of volcanic glass.

In Yosemite National Park short trails have been built and labels placed to indicate the best localities in which glacial polish and striae may be seen. The metamorphic rocks near El Portal and other geological phenomena are to be labeled, and studies are being conducted under the direction of the Carnegie Institution, preparatory to the establishment of a small station where the story of granite will be demonstrated.

Nature trails have been established and extended in practically all parks during the past year.

SCHOOL OF FIELD NATURAL HISTORY

The Yosemite School of Field Natural History completed its fifth session in Yosemite National Park during the summer of 1930. Twenty students of university grade were trained in field natural history and park administration by a staff of naturalists under the direction of Dr. Harold C. Bryant.

An interesting innovation was the establishment of a Junior Nature School in Yosemite Valley during the summer of 1930. This was offered in lieu of the sporadic children's trips conducted in previous seasons. A specially trained ranger-naturalist, assisted by six mothers of the community, conducted this six weeks' school very successfully.

COOPERATIVE SERVICE TO PARK OPERATORS

Realizing the importance of contacts with the public made by bus drivers, chauffeurs, guides, and other employees of the park operators, a definite effort was made during the past year to furnish authentic information and training for these employees. In Yosemite National Park a series of meetings was arranged which offered employees the opportunity of becoming acquainted with the history, geology, and all phases of the natural history of Yosemite.

In Yellowstone National Park the park naturalist prepared a manual of information for bus drivers, which was printed and distributed by the park operators.

In Grand Canyon National Park a similar manual of information was prepared by the park naturalist and was mimeographed and distributed by the operators' transportation organization. Also, bus drivers and guides attended a number of specially arranged meetings, where the geology of the Grand Canyon was discussed in detail by Dr. John C. Merriam, Dr. Wallace Atwood, Park Naturalist McKee, and others.

UTILIZATION OF THE PARKS BY UNIVERSITIES

The past year has been marked by a great increase in the utilization of national parks by universities and other professional organizations for the express purpose of field demonstration of geology, geography, botany, and many other fields of science so adequately represented in these great natural areas. The number of institutions taking advantage of the splendid opportunities for field work offered in the national parks is so large that the individual parties can not be enumerated in this short report. In practically every instance assistance was rendered by members of the Park Service educational staff and facilities arranged so that field work and demonstrations could be most effectively accomplished.

Summary of current educational activities in the national parks for the year ended September 30, 1930

National park	Field trips		Lectures		Museum attendance	Total persons served	Visitors during period
	Number	Attendance	Number	Attendance			
Bryce Canyon.....	134	4,100	122	13,780		17,880	36,000
Crater Lake.....	112	2,056	104	15,380	13,566	31,002	157,693
General Grant.....	18	582	18	7,180	990	8,752	18,568
Glacier.....	509	5,845	293	15,310	28,000	49,155	75,000
Grand Canyon.....	203	4,054	390	36,208	44,514	84,776	175,000
Hawaii.....	398	13,862	215	11,029	7,761	32,652	88,500
Mount Rainier.....	305	4,055	145	31,981	121,000	157,036	250,000
Rocky Mountain.....	105	867	9	1,165	1,647	3,679	255,874
Sequoia.....	180	5,991	369	61,071	28,973	96,035	69,181
Yellowstone.....	1,786	90,262	1,581	388,595	207,817	686,674	227,901
Yosemite.....	784	22,353	2,093	232,495	226,570	481,418	495,000
Zion.....	200	6,990	338	18,900	9,500	35,390	56,000
Total.....	4,734	161,017	5,677	833,094	690,338	1,684,449	1,904,717
Total number of persons counted on all field trips.....							161,017
Total number of persons counted at all lectures.....							833,094
Total number of persons counted at all museums.....							690,338
Grand total.....							1,684,449

Under field trips are included Grand Canyon, Yellowstone, and Yosemite auto caravans.

No naturalists this year in Rocky Mountain National Park.

Under "Museum attendance," Mount Rainier, the figure 121,000 includes 76,000 persons using nature trails.

September figures estimated.

REPORT OF FORESTRY DIVISION

ANSEL F. HALL, Chief Forester, Berkeley, Calif.; JOHN D. COFFMAN, Fire Control Expert

The activities of the forestry division are confined chiefly to the protection of park forests against fire, insects, tree diseases, and other injuries. Technical assistance is rendered to individual parks by the headquarters staff of the forestry division, chiefly in the field of fire protection, in which the fine work of Fire Control Expert John D. Coffman is to be especially commended.

FIRE PLANS

The detailed survey of fire hazard in the national parks started last year was continued by Mr. Coffman, and additional data were gathered in Mount Rainier, Glacier, Yellowstone, Rocky Mountain, Grand Canyon, Sequoia, General Grant, Yosemite, and Lassen Volcanic National Parks, and in Muir Woods National Monument. Based upon these studies, detailed fire-protection programs and estimates were prepared for Mount Rainier, General Grant, Crater Lake, Yellowstone, and Rocky Mountain National Parks, and have been submitted to the director. The field work for the Grand Canyon program has also been accomplished. Additional field work and the drafting of a supplemental protec-

tion program have followed the recent timber purchase and extension of the west boundary of Yosemite National Park.

Material assistance was rendered to many of the parks in the preparation of the 1932 protection estimates and justifications, and those for all parks were carefully reviewed and supplemented where necessary.

FIRE DETECTION AND SUPPRESSION

The increase in fire-prevention funds has materially advanced the fire-protection program in the employment and training of protection personnel, and also in the purchase of fire-suppression equipment and in the construction of physical improvements necessary to the protection program,

Standard fire-lookout house plans were prepared by the landscape division in cooperation with the forestry division, and during the summer of 1930 eight new fire-lookout houses were constructed in five national parks. Assistance in the training of fire-protection personnel in several of the parks was rendered during the spring of 1930, when the fire-control expert attended the training camps for the fire-protection organizations in Sequoia, Yosemite, Glacier, and Mount Rainier National Parks.

THE 1929 FIRE SEASON

A condensed analysis of the forest-fire situation for the season of 1929 is appended to this report. Owing to the fact that the present annual report is submitted before the close of the 1930 season it is impossible to present similar data for 1930. The most disastrous calamity of the season of 1929 was the Half Moon fire in Glacier National Park reported by the director in his last annual report.

INSECT CONTROL

Frequent conferences at Berkeley with members of the Bureau of Entomology enable the staff at forestry headquarters to act as a clearing house for the reporting of insect infestations in the national parks. Based upon data received through the cooperation of the Bureau of Entomology, upon field reports submitted from the individual parks, and upon data secured personally by the members of the forestry headquarters staff, preliminary and final estimates and justifications for insect control in all the parks for the fiscal year 1932 were prepared for the director.

The mountain pine beetle infestation in Crater Lake National Park continued to be serious during the 1930 season, but due to the intensive control measures is reported as decreasing.

A serious epidemic of beetle infestation was discovered in the spring of 1930 in Glacier National Park, and, although control measures are being pushed, it was rapidly spreading at the time this report was submitted.

Another serious epidemic of bark beetles is attacking the pines in Sequoia National Park. The infestation is being vigorously combated, but control will have to be continued intensively during the next year.

During the summer of 1930 James C. Evenden, of the Coeur d'Alene station of the Bureau of Entomology, conducted a comprehensive insect survey of Yellowstone National Park by airplane. This survey yielded gratifying results, inasmuch as it indicated a low degree of infestation.

TREE DISEASES

Conferences relative to a blister-rust control program were held with Senior Pathologist Stephen H. Wyckoff at field headquarters in San Francisco during November, 1929, and January, 1930, and estimates and justifications for this work in the infested and threatened parks were furnished to the director.

During the season of 1930, \$5,000 is being spent in Ribes eradication in Mount Rainier National Park, in accordance with the recommendation of the office of blister-rust control, under the direction of which the work is being carried out. The disease is present in Mount Rainier National Park not only on the currants and gooseberries but upon the white pine as well. This means that it will spread very rapidly, possibly over a distance of several miles.

Suppression activities were continued in Acadia National Park under the direction of the officers of the blister-rust control,

A survey and experiments were conducted in Crater Lake National Park by field investigators of the blister-rust control in order to collect data upon which estimates for control measures in that park will be based.

NATIONAL PARK SERVICE

Forest fire statistics, calendar year 1929

[M b. f. = thousand board feet. Figures on timber destroyed are estimates and not actual cruises]

Park	Classification of fires				Location of origin of fires				Area burned inside parks				Timber destroyed inside parks				Costs of fire suppression						
	A (¼ acre or less)	B (Between ¼ and 10 acres)	C (10 acres or over)	Total (all classes A, B, and C)	Inside parks		Outside parks		Timber Acres	Brush Acres	Grass Acres	Total Acres	Government Mb. f.	Private Mb. f.	Total Mb. f.	Personal services Dollars	Supplies, transportation, etc. Dollars	Equipment Dollars	Indirect prorated costs Dollars	Total Dollars	Salaries of park employees Dollars	Grand total Dollars	
					On Government lands	On private lands	Entered park	Confined to outside areas															
Acadia.....	1			1	1																6.26	6.26	
Bryce Canyon.....																							
Crater Lake.....	5			5	5																8.75	14.62	
General Grant.....	1			1	1																9.50	25.25	
Glacier.....	40	3	4	47	29	2	2	2	14	54,457	500		2								15.75	25.25	
Grand Canyon.....	4	3	4	11	11					257	3	16	54,957	250,000	3,000	253,000	58,793.21	39,360.08	22,947.36	1,670.24	122,770.89	3,035.82	125,806.71
Grand Teton.....		5		5	3				2	1	2		3	129		129	464.12	48.39		107.81	620.32	45.00	711.01
Hawaii.....	2			2	2																45.00	45.00	
Hot Springs.....		1		1	1					7			7								9.08	9.08	
Lassen Volcanic.....		1		1	1					1			1				75.85	14.43			90.28	7.83	98.11
Mesa Verde.....					0																		
Mount McKinley.....					0																		
Mount Rainier.....	17	3	5	25	21			2	2	215	18	13	243	135		135	9,141.96	6,068.43	2,098.21		17,308.60	846.11	18,154.71
Platt.....	3	2	5	10	5					20		45	65						50.00			16.00	66.00
Rocky Mountain.....	6	2	1	9	4			1	4	24			24	27		27	143.00			102.00	245.00	63.39	908.39
Sequoia.....	7			7	5				2					5		5	17.60			2.70	20.30	33.25	53.55
Sullys Hill.....		1		1	1							1	1										
Wind Cave.....					0																		
Yellowstone.....	19	6	1	26	24				2	20	2	11	33	13		13	191.32	30.50			221.82	101.00	382.82
Yosemite.....	18	6		24	21				1	16	4	2	22	5		5	194.48	42.68		38.34	275.50	280.22	555.72
Zion.....	1			1	2					20			20								18.37	18.37	
Pinnacles Monument.....					1			1				50	50				44.00				44.00		44.00
Total.....	121	35	20	176	138	5	6	27	55,040	529	138,557,707	250,315	3,000,253,315	69,086,094.5	564.51	25,095.57	1,922.16	141,668.33	5,231.27	146,899.60			

Park	Causes of fires							Classification of fires according to cost of suppression											
	Lightning	Rail-roads	Camp fires	Smok-ers	Brush burn-ing	Incen-diary	Lum-bering	Miscel-laneous	Total man caused	Grand total	\$25 and under	\$26 to \$50	\$51 to \$100	\$101 to \$200	\$201 to \$500	\$501 to \$1,000	\$1,001 to \$2,000	Over \$2,000	Total
Acadia.....	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
Bryce Canyon.....	1			1					1	0	1								1
Crater Lake.....			3	1	1				5	5	5								0
General Grant.....					1				2	2									5
Glacier.....	22	8	3	10	1	1	1	1	25	47	35	1	4	4	1	1		1	2
Grand Canyon.....	7		1	1	2				4	11	8			2	1				47
Grand Teton.....	1		1	1	2				4	5	5			2	1				11
Hawaii.....				2					2	2	2								5
Hot Springs.....				1					2	2	2								2
Lassen Volcanic.....				1					1	1	1		1						1
Mesa Verde.....									1	1									1
Mount McKinley.....										0									0
Mount Rainier.....			2	1	3				9	25	17	1	2	1	2		1	1	0
Platt.....	16			5				3	5	5	3	2							25
Rocky Mountain.....			2	5					5	5	3					1			5
Sequoia.....	1			5				1	8	9	8								9
Sullys Hill.....	3		1	2				2	5	8	8								8
Wind Cave.....				1					1	0	1								1
Yellowstone.....																			0
Yosemite.....	5	1	6	12	1			1	21	26	25	1							26
Zion.....	12		2	7	2			1	1	24	17	5	1		1				24
Pinnacles Monument.....				1				11	1	2	2								2
Total.....	67	9	21	54	13	1	1	10	108	176	149	11	8	7	5	1	1	1	176

1 Landslide.

REPORT OF SANITATION DIVISION

H. B. HOMMON, Sanitary Engineer, United States Public Health Service, San Francisco Calif.

In accordance with an agreement between the Director of the National Park Service and the Surgeon General of the Public Health Service, made in 1921, sanitary engineers of the Public Health Service continued, as in previous years, to cooperate with the superintendents of the national parks and custodians of the national monuments on all problems of sanitation in the parks and monuments. The general plan of the work consisted of general inspections of hotels, lodges, and all other places where operators handled or served food products or provided lodgings; inspections of automobile and housekeeping camp grounds and Government messes; inspection of water supplies, sewage-treatment plants, and garbage incinerators; preparation of plans for water-supply systems, sewage-treatment plants, and garbage incinerators; mosquito-control work; and miscellaneous activities pertaining to sanitation.

INSPECTION OF HOTELS AND LODGES

During the year inspections were made at hotels, lodges, and other public places handling or serving food products in 13 of the national parks. The sanitary conditions of these places were found, on the whole, very satisfactory and far better than they were a few years ago. There are, however, a few kitchens and stores, especially those handling soft drinks, that are not up to standard requirements.

INSPECTION OF AUTOMOBILE CAMPS

The automobile camps have grown so rapidly during the last few years that it has been practically impossible to anticipate the requirements of the future and to provide adequate facilities for the camps from year to year. During the past year, however, the camps were kept cleaner than ever before and the accommodations more nearly met the requirements than at any other time. This was due to employment of more men, better organization, and to the expenditure of larger sums of money for improvements. It is believed that the automobile camps in the national parks are better managed, cleaner, and have more satisfactory accommodations than any other camps of a similar nature outside the parks.

INSPECTION OF HOUSEKEEPING CAMPS

The housekeeping camps have, as a general rule, been found very unsatisfactory. The writer discussed these camps before the conference of park superintendents held last September at Yellowstone Park, and Mr. Vint and he were appointed as a committee to study the problem and make recommendations for a standard cabin. A report with plans was submitted and has been adopted. The adoption of the standard cabin with the equipment recommended will provide for the public accommodations above the average found outside the parks, whereas up to the present time they have been far below.

WATER SUPPLIES

The more important work done during the year in connection with the water supplies in the 13 parks visited included (1) cooperation with the chief engineer of the Park Service in preparation of plans for additional water supply for Carlsbad; (2) recommendations for increasing the water supply at Casa Grande; (3) recommendations to the superintendent of Crater Lake for conserving and increasing water supplies at Government headquarters and the rim area; (4) recommendations for increasing the water supply at General Grant; (5) recommendations for developing a new water supply and distribution system for automobile camp and Many Glacier Hotel in Glacier; (6) recommendations for new water-supply systems for camp grounds at Jenny Lake and String Lake in Grand Teton Park; (7) preparation of plans and estimates for water-supply system at Lassen; (8) recommendations and estimates of cost for new water-supply system for Pinnacles; (9) cooperation with the chief engineer in preparation of plans for a new water-supply system at Wind Cave; (10) cooperation with engineers in Yellowstone on plans for new

water-supply line for Mammoth and other places in park; (11) recommendations for development of springs to supplement valley water supply in Yosemite and a new water-supply for Tuolumne Meadows. At the Public Health Service laboratory in San Francisco there were made, at weekly intervals during the year, bacteriological analyses of samples of water collected from the Merced river above the sewage-treatment plant, below the plant, and at the park boundary, and below El Portal, and from the valley and other supplies in Yosemite Park.

In addition to the work outlined above, a large number of chemical and bacteriological analyses of samples of water collected from supplies in other parks were made at the Public Health Service laboratory.

SEWAGE DISPOSAL

The more important activities carried on during the year in connection with sewage disposal in the parks included: (1) Preparation of tentative agreement between the Government and Utah Parks Co. for operation of sewerage system and treatment plant at Bryce; (2) preparation of plans, bills of materials, and specifications for sewerage system and disposal plant for Casa Grande; (3) plans and specifications for sewerage system and disposal plant for camp-ground area at rim of Crater Lake; (4) investigations and reports of methods for sewerage disposal at Belton headquarters, Logan Pass, and Hudson Bay Divide in Glacier; (5) detail of a sanitary engineer to the Grand Canyon to operate sewage-treatment plant at south rim in absence of operator, and assistance to superintendent in various problems of sewage disposal at north and south rims; (6) preparation of plans and estimates for sewerage systems and disposal plants for camp grounds at Jenny and String Lakes in Grand Teton Park; (7) plans and estimates of cost for sewerage system and disposal plant for Lassen; (8) preparation of preliminary plans and estimates for sewerage system, and treatment plant for reclaiming sewage at Mesa Verde; (9) preparation of plans for sewerage system and disposal plant for Yakima Park in Rainier; (10) recommendations for a new sewerage system at Pinnacles; (11) preliminary plans for sewage disposal at Glacier Basin, Aspen, and Endovalley camp grounds, and extensions and improvements of sewage-disposal systems at Bear Lake Lodge and Grand Lake Hotel in Rocky Mountain; (12) assistance to superintendent of Sequoia in construction and operation of sewerage system and treatment plant at Government headquarters; (13) recommendations for new sewerage system and disposal plant for Wind Cave; (14) preparation of plans for sewage-disposal plant for fish hatchery at Lake in Yellowstone, and recommendations for improvement and extensions of the 11 disposal plants in the park, 6 of which have liquid chlorine machines to disinfect the sewage; (15) preparation of plans for sewage-treatment plant on floor of valley at Yosemite; recommendations for design and construction of extension of sewer system and for auxiliary pumping units on sewerage system now in use on the floor of the valley; preparations of plans for sewage-disposal plant for Glacier Point; and investigation of available methods of disposal of sewage for new developments at Tuolumne Meadows.

The sewage-treatment plant at the Grand Canyon continued during the year to produce an effluent equal in quality from a bacteriological standpoint to the standards for drinking water, and the amount reclaimed approximated 99 per cent of all the wastes discharged into the sewers. The amount reclaimed daily averaged in excess of 100,000 gallons, in which the Government has an equity of 10 per cent. In terms of fresh water the 10 per cent of reclaimed sewage used by the Government has a value of approximately \$30 per day. The only expense to the Government for operating the plant, which was constructed jointly by the Government and the Atchison, Topeka & Santa Fe Railway Co., is the salary of the operator in charge of the plant.

As a result of the practical demonstration at the canyon that, from a health and economical standpoint, sewage can be reclaimed for industrial purposes, cities and industrial plants in southern California are carrying on extensive investigations to determine the practicability of reclaiming sewage on a large and comprehensive scale.

The treatment plant designed for Yosemite Park is unusual in many respects. The plant had to be located near the river and within a few hundred feet of the two highways along the river, and it had to be designed so that when completed and in operation there will be no odors, the structures will not be seen from the

highways on the floor of the valley or on the slopes out of the valley, and the Merced River will not be contaminated. To meet these conditions it was necessary to include in the design devices for producing the highest quality of effluent, to make provisions for collecting and burning gases from decomposition of sewage, to dry solids from sewage in glass-covered sludge beds, and provide the most modern equipment for disinfecting the final effluent. The gas produced in the digestion of the solids is practically the same as natural gas and it will be collected in a gas holder and used to heat the solids (sludge) in the digestion tanks. By heating the sludge more rapid and uniform digestion takes place in the sludge.

GARBAGE DISPOSAL

On account of the high proportion of wet garbage produced in the parks and the high cost of patented incinerators for burning wet garbage, a special type of incinerator was designed at our office a few years ago for use in the parks, and a can-baling machine of the kind used by the American Can Co. for baling scrap tins was recommended for baling waste tin cans. The incinerator, which costs approximately 50 per cent less than commercial types, has been found very practical and the cost of maintenance and operation has not been more than the average for large incinerators operated by cities.

There are now in operation 2 incinerators at the Grand Canyon, 2 at Sequoia, 1 at Rainier, 1 at Yosemite, 1 at General Grant, and 3 in operation at Yellowstone and 2 under construction. Can-baling machines are in operation at Yosemite and the Grand Canyon. By baling the waste tin cans without burning in the incinerators, the capacity of the incinerators is increased about 50 per cent, and by baling the volume of the cans is reduced 92 per cent, and through abrasion of the tin the cans rust away quickly.

REPORT OF FISH-CULTURAL INSPECTIONS AND ACTIVITIES

FRED J. FOSTER, District Supervisor, Bureau of Fisheries

ADOPTION OF NEW POLICY

Appreciating the necessity of greater information concerning the water resources along fisheries lines in the various national parks, and the need for closer cooperation between the Bureau of Fisheries and the National Park Service, the director, during the spring of 1929, through the Secretaries of the Interior and Commerce, secured the detail of the writer from the Bureau of Fisheries for the purpose of studying the fish-cultural needs of the National Park Service. This work was started on July 1, 1929, and the major portion of the writer's time since then was employed in this work.

PARKS VISITED

Yellowstone Park was studied from July 11 to October 24, except for a short inspection at Glacier Park. As in other parks, work here was more in the nature of a preliminary survey to determine exact needs. In this instance, however, considerable time was spent in the detailed examination of individual waters, with the result that a rather complete stocking policy has been outlined. A report of investigations was made at the close of the 1929 season, with various recommendations. Some of the most important results have been a change in policy regarding the planting of eyed eggs; the rearing of a large number of fish of various species to larger size before distribution, particularly for heavily fished waters; the formulating of definite policies for the planting of individual waters; and the appointment of a ranger who will have as his first duties the interests of fishing in Yellowstone Park, and will be in direct charge of the distribution of all fish. It is felt that as time goes on the adoption of these policies will be of much benefit to the park.

Glacier Park was visited twice during the fiscal year. The nature of both visits was purely preliminary to a complete survey and the expansion of the fish-cultural work. A biological and physiological examination of all the waters in Glacier Park is clearly indicated, and until such survey is accomplished the stocking policy will be more or less of a hit-and-miss nature, with uncertain

results, as in the past. An urgent need exists for increased hatchery facilities on the west side of the park. This matter was brought to the attention of the Commissioner of Fisheries, who has assurance that funds will be available for this work at an early date.

Yosemite Park was visited during November, 1929, and a detailed report made of these preliminary investigations. It is evident to the writer that a distinct change in the stocking policy and the rearing of fish to large fingerlings and legal size for planting in heavily fished waters will have to be accomplished before satisfactory results are obtained in the way of fishing in this park.

Grand Canyon Park was visited in April, 1930, and a rather thorough examination made of a part of the limited fishing waters. A careful study of the fishing possibilities in all waters was made and stocking policies outlined. A detailed report of this investigation is being held pending receipt of water analysis for Havasu Creek.

Rocky Mountain National Park was not visited, but conference was held with the superintendent at his office in Denver regarding general fish-cultural conditions.

Mount Rainier Park was not visited by the writer, but under direction of the Bureau of Fisheries the superintendent of the Baker Lake Fisheries Station made an inspection with a view to establishment of a hatchery in the park or as near thereto as a suitable location could be found. The construction of this hatchery, which it is hoped can be accomplished within the next fiscal year, will amply take care of the needs of this park.

Proposed Everglades Park was not visited by the writer during the inspection trip of last winter, but by reason of knowledge of conditions and aquatic life in southern Florida a report was submitted for consideration in connection with the investigations mentioned.

GENERAL RECOMMENDATIONS

Survey of park waters.—A detailed biological and physiological survey of the waters in our national parks is clearly indicated by the study of this past fiscal year. It is recommended that this be accomplished by the employment of professors of biology and zoology during summer vacation season, working under the direction of the writer. Forms have been prepared indicating the exact nature of the information desired, from which definite policies of management for each individual water may be formulated.

Appointment of park rangers for fisheries activities.—The excellent results obtained so far in the detail of Ranger McCarty in Yellowstone Park to take charge of the distribution, secure information desired, and act as contact man with the representatives of the Bureau of Fisheries, special parties, and the public in general, have clearly demonstrated the desirability of such a procedure. It is recommended, therefore, that similar positions be created in Glacier, Yosemite, Rocky Mountain, and in other national parks where fishing forms a major attraction. The value of such services can not be overestimated.

Predatory animals and birds destroy many fish in national parks each year. There is insufficient knowledge at this time regarding the food habits of such animals and birds, as the otter, mink, fish ducks, heron, osprey, kingfisher, and others. Exact knowledge should be obtained as to the number of fish destroyed by each of the species named, and an investigator should be detailed by the Biological Survey for such work, or, if not available from this source, one should be employed by the Park Service.

Investigation of food habits of the pelican has already been made by Doctor Ward, and has indicated the necessity for further investigations of other species of predatory birds and animals. Arrangement has been made with Dr. M. C. Hall, Chief of the Zoology Division of the Bureau of Animal Industry, for studies of parasites whose life cycle is reached in both bird and fish.

ACKNOWLEDGMENT

The writer wishes to express his sincere appreciation of the whole-hearted interest and cooperation of the entire personnel of the National Park Service. The work this past year has indeed been made a pleasure, largely through these contacts.

REPORT OF SURVEY OF WILD-LIFE CONDITIONS

GEORGE M. WRIGHT, Scientific Aid, Berkeley, Calif.

Since this is its first inclusion in an annual report of the director, a brief explanation of the project and the critical conditions responsible for its organization is in order.

Preservation of the parks in as nearly as possible a natural state—that is, their state when white man first saw them—is a principle underlying all phases of National Park Service administration. At present the status of animal life is changing with such alarming rapidity that it will soon be too late in many of the parks ever to determine what the original conditions might have been. In some, birds or mammals making up the original complement of their faunas have already vanished. With the encroachment of civilization it may be that preservation within those parks will be their only hope of escape from extinction. Many other species are approaching the red line of extreme danger. There is yet a third group composed of certain aggregates of animals which are running amuck through the destruction of their natural controls and from other causes.

Members of this party requested the privilege of undertaking, immediately and at their own expense, a preliminary survey of animal problems in the national parks. One outstanding desire motivated this action, namely: To meet the present emergency until the necessarily deliberate steps required to obtain regular appropriation shall finally result in the establishment of a division which will provide intelligent, scientifically planned management for the wild life of the national parks. Also, it was hoped that this survey would serve to hasten the adoption of such a program by focusing attention on the problem and providing data which would expedite the establishment of a permanent division of wild-life management in the Park Service.

THE ASSIGNMENT

The essentials of the plan as approved by the director were:

That Mr. Wright should be released from his appointment in Yosemite and associate with him Joseph S. Dixon, of the University of California, who is well qualified to undertake this activity through his outstanding contributions as economic mammalogist and his enthusiastic interest in the animal life of the parks;

That the chief assignment was to submit a complete report of findings to the director at the termination of two years' active work in the field;

That a coincidental assignment was to cooperate with the central administration, the park superintendents, and their staffs in attempting the solution of those animal problems requiring immediate action.

THE ORGANIZATION

To accomplish these things, the following organization has been effected during the past year.

Personnel.—In addition to Mr. Dixon and Mr. Wright, the staff now includes Ben H. Thompson, research associate, and Mrs. George Pease, secretary. Mr. Thompson joined the enterprise on a full-time basis on May 1, 1930, after a year of special preparation at the University of California. Mrs. Pease has had an ever-increasing burden of work in the office which may make it necessary to employ part-time assistance for her in the near future.

Quarters.—The project is managed from a central office in the American Trust Building, Berkeley, established on August 1, 1929. Careful attention has been given to originating filing systems for field data, reference notes, and photographs, as it was necessary that they should be adapted especially to this new type of work. A reference library and a bibliography have been established and are being expanded as rapidly as possible. There are 104 books on the shelves and a reprint collection in addition. Special maps for plotting significant data are in course of preparation.

Field equipment.—A field car, with body especially designed by members of the staff to meet the new requirements, was put into service on May 24, 1930.

For use in obtaining the photographic record, the following equipment has been selected:

- One Telescopic Graflex, 3¼ by 4¼ (with Dallmeyer telephoto lens).
- One Press Graflex, 4 by 5
- One Cycle Graphic, 5 by 7 (with two Goerz lenses).
- One Korona Pictorial View, 3¼ by 4¼.
- One Standard DeVry 35-millimeter motion-picture camera and tripod.
- One Cine Kodak 16-millimeter motion-picture camera and tripod.

A collapsible rubber boat has proved invaluable already in studies of the trumpeter swan in Yellowstone.

The remainder of the equipment consists of paraphernalia enabling the party to camp out and carry on field investigations at high elevations and low, both in the heat of summer and the cold of winter.

FIELD ITINERARY

In making the following trips approximately 9,100 miles were covered by auto and 2,200 miles were covered by train. Time in the field has been less than in the original plans because of the illness of Mr. Wright on two occasions. In the meantime, organization of the office has been emphasized, and it is planned to crowd the field work as much as possible in the future:

July 2 to 22, 1929, Yosemite National Park (Dixon).

July 23 to 30, 1929, Dana Meadows and Saddlebag Lake (Dixon, Wright, and Thompson).

September 7 to 27, 1929, Yellowstone National Park (Dixon).

October 28 to November 5, 1929, Yosemite National Park (Dixon).

December 14 to 22, 1929, Sequoia National Park (Dixon).

February 6 to 9, 1930, Yosemite National Park (Dixon).

March 29 to April 1, 1930, Yosemite National Park (Dixon, Wright, Thompson).

May 24 to July 26, 1930, Zion, Grand Canyon, Bryce Canyon, Rocky Mountain, Grand Teton, and Yellowstone National Parks (Dixon, Wright, Thompson).

August 27 to September 3, 1930, Sequoia National Park (Dixon, Thompson).

COSTS

The following is a summary of expenses for the period July 1, 1929, to June 30, 1930. This data has been kept in detail, as it is felt to be an important phase of the final report.

Salaries:

Joseph Dixon	\$4,000.00
Ben H. Thompson	100.00
Secretarial assistance	1,488.71
	<hr/> \$5,588.71

Field:

Car and insurance	2,095.08
Travel expense	1,092.90
Field equipment	292.82
Cameras, film, etc	1,583.28
	<hr/> 5,064.08

Office:

Furniture and equipment	788.33
Rental	546.00
Stationery, sundries, telephone, etc	633.54
	<hr/> 1,967.87

Total

12,620.66

The above costs include considerable permanent equipment. Estimates indicate that operation for the second year will not total over 68 per cent of this figure.

PROGRESS

Work toward the final report has progressed satisfactorily. The survey has been organized; the final report planned; filing methods for the reception and systematization of all material have been devised; and significant data has been gathered in the parks visited. To date, 1,419 still photographs and 3,000 feet of standard motion-picture film have been taken in the field for illustrative evidence.

Urgent problems which have been considered in consultation with park officers by request are those dealing with deer and bear in Yosemite, bear in Yellowstone, deer in Sequoia, and bear and mountain sheep in Rocky Mountain.

The greatest expenditure of time and effort was made in the case of the trumpeter swan in Yellowstone. Here is the last stand of the largest of all American waterfowl. Immediate action upon the part of the park administration may yet save this bird from extermination. A study of nesting swans at Trumpeter Lake and Tern Lake has furnished hitherto unknown life-history data on this rare species and has resulted in recommendation of protective measures. It is hoped that if these are put into effect by the next nesting season the trumpeter swan may yet be perpetuated in the United States.



UNITED STATES DEPARTMENT OF THE INTERIOR
RAY LYMAN WILBUR, *Secretary*
NATIONAL PARK SERVICE
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ANNUAL REPORT
OF THE
DIRECTOR OF
THE NATIONAL PARK SERVICE
TO THE
SECRETARY OF THE INTERIOR
FOR THE
FISCAL YEAR ENDED JUNE 30, 1931
AND THE TRAVEL SEASON, 1931



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CONTENTS

	Page
Introduction.....	1
Inspections of the national park and monument system.....	4
National park standards.....	6
Land phases of national park and monument activity.....	7
New national monuments.....	8
Acquisition of alienated lands.....	8
Additions to existing parks and monuments.....	10
Pending boundary problems.....	11
Park and monument projects.....	13
Investigations of proposed parks and monuments.....	15
Educational and research developments.....	16
The educational program in the parks.....	17
Museums.....	17
University field classes.....	19
Yosemite school of field natural history.....	19
Junior nature school.....	19
Field headquarters.....	20
Libraries.....	20
Nature trails.....	20
Live animal displays.....	20
Wild flower displays.....	21
Scientific research.....	21
Animal protection studies.....	21
Other investigations.....	22
Visual education.....	23
Animal conditions.....	23
Preservation of park landscape.....	26
Protection of park forests.....	27
The fire situation.....	27
Insect and tree disease control.....	27
Public relations and publications.....	28
Bilingual park booklet for Paris Exposition.....	29
Scientific publications.....	29
National Parks Portfolio revised.....	29
Larger supplies of free pamphlets needed.....	30
Books and other non-Government publications.....	30
Park road development.....	32
Eastern national park-to-park highway.....	33
Appropriations and revenues.....	34
Donations.....	34
Sanitation and medical service.....	35
Public-utility service.....	35
Housekeeping camps.....	36
Air service in the national parks.....	37
Winter use of the parks and monuments.....	38
Boy Scout activities.....	40
State park progress.....	41
The year in the national parks and monuments.....	42
Acadia National Park.....	42
Park travel.....	43
Road developments.....	43
Scientific researches.....	44
Bryce Canyon National Park.....	44
Roads and trails.....	44
Wild life survey.....	44
Topographic map of the park.....	45

	Page
Carlsbad Caverns National Park.....	45
Approach highways.....	45
"Bat" lectures.....	45
Accommodations.....	46
Proposed extension.....	46
Crater Lake National Park.....	46
Landscape developments.....	47
Fishing.....	47
Accommodations.....	47
General Grant National Park.....	47
Glacier National Park.....	48
Travel.....	48
Protection.....	48
Trail improvements.....	49
Roadside clean-up.....	49
Educational activities.....	49
Animal conditions.....	50
Elimination of privately owned land.....	50
Service of public utilities.....	50
Grand Canyon National Park.....	50
Park experiences its greatest construction period.....	51
Approach roads.....	52
Landscape and restoration work.....	52
Popularity of campfire lecture.....	52
Wild life in the park.....	53
Desert View rest room.....	53
Airplane service.....	53
Grand Teton National Park.....	53
An ideal nearly attained.....	54
Jackson Lake shores to be cleaned up.....	55
Road and trail construction.....	55
Administrative developments.....	56
Wild life.....	56
Ascents of high peaks.....	56
Photographic shop.....	57
Support of Jackson Hole people.....	57
Great Smoky Mountains National Park.....	57
Status of lands.....	57
Road construction.....	58
Forest protection.....	58
Fishing.....	59
Hawaii National Park.....	59
Naturalist activities inaugurated.....	59
Need for betterment of accommodations.....	59
Hot Springs National Park.....	60
Water system improved.....	60
Lassen Volcanic National Park.....	61
Mesa Verde National Park.....	62
The Laboratory of Anthropology.....	62
Congressional aid to the park.....	62
Drilling for water supply.....	63
Road and trail developments.....	63
Navajo labor.....	63
Repair of Sun Temple.....	64
Mount McKinley National Park.....	64
Mountain sheep and other wild life.....	64
New roads and bridges.....	65
Service to the public.....	65
Over Mount McKinley by airplane.....	65
Park headquarters.....	65
Mount Rainier National Park.....	66
Area of park increased.....	66
Roads and trails.....	66
High fire hazard.....	67
Fish culture activities.....	67
Educational department.....	67

Mount Rainer National Park—Continued.	Page
Glacier recession.....	68
Public utilities.....	68
Platt National Park.....	68
Rocky Mountain National Park.....	69
Trail system being extended.....	69
Progress in road building.....	70
Landscaping activities.....	70
The wild life.....	70
New information office and museum.....	71
A great tourist resort.....	71
Sequoia National Park.....	71
Year-round travel increases.....	72
Educational activities.....	72
Forest and meadow protection.....	72
Wind Cave National Park.....	73
Yellowstone National Park.....	74
The wild animals.....	74
Many streams restocked.....	75
Excellent progress in road building.....	75
Sanitary improvements.....	76
The public-utility operators.....	76
Yellowstone's forests.....	77
No park boundary changes.....	77
General conditions never better.....	77
Yosemite National Park.....	77
Hetch-Hetchy agreement.....	78
Major road construction.....	79
Sanitation and water supply.....	79
Use of naturalist facilities.....	80
Landscaping.....	80
Signing of roads and trails.....	80
Park operators.....	80
Gifts.....	81
Zion National Park.....	81
Roads.....	81
Insect infestation control.....	82
Utilities.....	82
National monuments.....	82
Colonial.....	82
Wakefield.....	83
Devils Tower.....	83
Scotts Bluff.....	83
Colorado Monument.....	84
Boundaries of Katmai extended.....	84
Muir Woods.....	84
Natural boundaries for Pinnacles.....	85
The southwestern monuments.....	85
Construction.....	85
Roads.....	85
Water supply.....	86
Camp grounds and sanitation.....	86
Education.....	86
Monument travel.....	87
Necrology.....	87
Legislation.....	88
Bills enacted into law.....	88
Other measures introduced or pending in third session of the Seventy-first Congress which failed of enactment.....	91
Presidential proclamations.....	91
Executive orders.....	92
Recommendations.....	92
Conclusion.....	92
Appendix A.—Organization of the National Park Service.....	94

Appendix B.—The national parks and monuments:	Page
Map showing location of national parks and monuments administered by the National Park Service.....	96
The national parks administered by the National Park Service, Department of the Interior.....	97
The national monuments administered by the National Park Service, Department of the Interior.....	101
The national monuments administered by the Department of Agriculture.....	105
The national monuments administered by the War Department.....	107
The national military and other parks administered by the War Department.....	108
Statement of holdings acquired by deed for national park and monument purposes.....	109
Appendix C.—Travel and fiscal statistics:	
Visitors to the national parks, 1916–1931.....	111
Detail comparative statistics of travel and campers, 1930–1931.....	112
Visitors to the national monuments, 1926–1931.....	114
Private automobiles entering the national parks during the seasons 1924–1931.....	114
Automobile and motor-cycle licenses issued during seasons 1927–1931.....	115
Receipts collected from automobiles and motor cycles during seasons 1927–1931.....	115
Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during recent fiscal years.....	115
Statement of amounts reappropriated and made available for expenditure in subsequent fiscal years.....	119
Statement of amounts transferred under the authority contained in the appropriation acts to transfer 10 per cent from one appropriation to another, fiscal year 1931.....	119
Summary of appropriations for the administration, protection, and improvement of the national parks and national monuments, together with the revenues received, for the fiscal years 1917–1931, inclusive.....	119
Statement of appropriations and authorizations for road and trail work in the national parks and national monuments.....	120
Appendix D.—Reports of engineering, landscape architectural, educational, forestry, sanitation, fish-cultural operations, and wild-life survey divisions:	
Report of civil engineering division.....	121
Report of landscape architectural division.....	128
Report of field headquarters, branch of education.....	134
Report of the forestry division.....	139
Report of sanitation division.....	143
Report of fish-cultural inspections and activities.....	146
Report of preliminary wild-life survey.....	148

ANNUAL REPORT OF THE DIRECTOR OF THE NATIONAL PARK SERVICE

DEPARTMENT OF THE INTERIOR,
NATIONAL PARK SERVICE,
Washington, D. C., October 14, 1931.

THE SECRETARY OF THE INTERIOR.

SIR: It is a pleasure to submit to you this fifteenth annual report of the National Park Service. At the outset may I express to you the gratitude of the members of our organization for your sympathetic interest in and support of the activities of the service both in Washington and in the field. Your visits during the past summer to Rocky Mountain, Mesa Verde, Yosemite, Sequoia, General Grant, Lassen Volcanic, and the Great Smoky Mountains National Parks gave you opportunities to review several very important projects. Moreover, your words of encouragement to the men and women of these mountain parks were most inspiring and were highly appreciated by them and by me.

This report does not conform strictly to the fiscal year for various special reasons. It is desirable to record here the results of the season's operations, many of which were hardly more than begun at the close of the last fiscal period. We have long had a "travel year" which terminates September 30, approximately the end of the tourist season in most of the national parks. As the closing date of this period about coincides with the submission date of the annual report, our operations are recorded up to that date. This report, therefore, is for the year ended September 30, 1931, while our financial affairs are discussed in the proper place as of June 30, 1931, the close of the regular Government fiscal year.

There was nothing spectacular in the work of the National Park Service during the past year, but steady progress was made in all lines of activity.

Congress, as usual, gave consideration to many important legislative measures affecting the national park and monument system. Altogether in its last session, which ended March 4, 1931, the Congress passed 22 bills involving National Park Service activities. During the entire Seventy-first Congress a total of 47 bills affecting the national parks and national monuments was enacted into law.

Appropriations for the 1932 fiscal year, under which we are now operating, total \$12,754,250. Compare this figure with \$12,113,435 available in last fiscal year, but which included \$2,078,000 allocated from emergency employment funds. The funds available in the 1930 fiscal year were \$7,813,817.18. Cash donations for park and monument development purposes in 1931 amounted to \$65,157.12. In

addition to the Federal appropriation, authority was given to the Secretary of the Interior to enter into contractual obligations on road and trail work up to a total of \$2,850,000. Revenues were \$940,364.79, against \$1,015,740.56 in 1930 and \$849,272.95 in 1929.

Travel to the national parks and national monuments this year has been especially interesting. Rail travel further decreased, this time approximately 30 per cent, due, of course, to general economic conditions. Travel by automobile increased. Total travel for the year was 3,544,856, as against 3,246,656 for the travel year ended September 30, 1930. This is a net increase of 9.18 per cent.

Most of our visitors this year were traveling on very limited budgets. In the present trying times, as never before, they appreciated our varied accommodations built to meet the requirements of all pocketbooks. On the other hand, however, limited patronage of all types of accommodations and services supplied by operators doing business under department franchise caused losses that are serious, and necessarily brought to a standstill projects involving further investment of capital.

The normal operations of the National Park Service were carried on throughout the year. Our permanent appointed personnel both in Washington and in the field on October 1, 1930, was 512. It is now 582. The service activities in protection and operation of the parks and monuments, maintenance of improvements, and in construction of new projects contributed substantially to unemployment relief. The average number of per diem employees on the monthly pay roll for the period from January 1, 1931, to September 30, 1931, was 1,532, ranging from a minimum of 184 employees in January to a maximum of 3,008 in July.

The National Park Service is now a Civil Service bureau as completely as any similar organization in the Federal Government. On August 10, 1931, the President, on recommendation of the Secretary of the Interior, covered the park superintendents and monument custodians into the Civil Service. During the year most of these officers were reallocated to grades and salaries more nearly commensurate with the dignity and responsibility of their positions.

The area of national parks is now 12,542.46 square miles, or 8,027,216.36 acres, an increase of 110.83 square miles, or 71,177.69 acres, since our last report. The national monuments now embrace 6,394.31 square miles, or 4,092,363.28 acres, an increase of 2,670.28 square miles, or 1,708,895.40 acres, during the year. There are now 22 national parks and 34 national monuments under the National Park Service.

Several major road projects were completed during the year, while others are being pushed to completion. Notable projects under way are the Wawona Road and tunnel in Yosemite, the Generals Highway between Sequoia and General Grant Parks, the Trail Ridge Road in Rocky Mountain, the Transmountain or Going-to-the-Sun Highway in Glacier, the Rim Drive in Crater Lake, the Colonial Parkway between Williamsburg and Yorktown, and the Summit Drive along the crest of the Blue Ridge in the proposed Shenandoah Park.

Under the Leavitt Approach Road Act of January 31, 1931, the Red Lodge-Cooke City and the Moran-South Boundary approaches to Yellowstone, the connecting road between Sequoia and General Grant

Parks, and the Desert View-Cameron approach at Grand Canyon have been started.

The Bureau of Public Roads continues to render extraordinary service to the National Park Service under the interbureau agreement. Its engineers take a keen interest in landscape preservation and are to-day building for us the most beautiful and spectacular roads in the world.

Our own landscape architectural division now embraces 20 professional architects and landscape architects. They are preparing the general plans for the development of the national parks and monuments, designing structures, making planting plans, and supervising all improvement work in the field from the standpoint of landscape protection. Notable projects under way are the restoration of grounds and gardens at Wakefield, the Carlsbad elevator station, the Mount Rainier Sunrise Ridge development, the Glacier Park-Many Glacier campground, the Crater Lake rim improvements, the Yosemite Glacier Point Highway and Valley restoration, the Colonial Parkway, and the clearing of the shores of Jackson Lake near Grand Teton Park.

The engineering division at San Francisco literally has hundreds of jobs in progress. It bought \$348,000 worth of equipment during the year and the construction projects which it aided or supervised involved a total expenditure of \$1,800,000. Among its more important undertakings are the High Sierra Trail in Sequoia Park, the Carlsbad elevators, the Hot Springs water impounding and distribution system, the Wind Cave electric and water systems, the Sunrise Ridge power plant, water system, parking area, and camp grounds in Mount Rainier Park, the Crater Lake electric system, the Mesa Verde well drilling for water, preparation of the Yorktown Battlefield for the sesquicentennial celebration, and many roads, trails, and buildings of unusual interest and value. There are 34 permanent employees in the engineering division, not counting resident engineers in several large parks.

The new Branch of Research and Education established just before the submission of my last annual report was expanded during the year by the addition of a park historian in the Washington office, and a widely known naturalist in the field.

Great strides were made in the extension of our educational activities. The museum on the shore of Lake Yellowstone and the Trailside Museum at Obsidian Cliff showing columnar basalt and obsidian, both in Yellowstone, were completed under funds made available by the Rockefeller Foundation. The Sinnott Memorial in Crater Lake National Park, authorized by Congress in memory of the late Representative N. J. Sinnott, for many years chairman of the House Public Lands Committee, was completed during the summer and dedicated by the congressional committee on July 16. The Rocky Mountain Park information office and museum was put in service, and at Petrified Forest and Casa Grande monuments new administration buildings to contain museum departments were authorized and are under construction.

The grand total of contacts made through the educational staff was 2,313,821.

The National Park Service cooperated notably with the United States Yorktown Sesquicentennial Commission in preparing for the sesquicentennial celebration by handling all of the construction work at Yorktown and taking over the details of purchasing, disbursing, and accounting for funds. This has placed an extra burden on the Washington office, both through the detail of certain of the personnel to Yorktown and also by the assistance furnished in general planning and supervision and the assuming of such special duties as handling the details of printing.

Excellent results have been attained in the development of the George Washington Birthplace National Monument at Wakefield, Va., established last year. The rehabilitation of the birth house and ancient kitchen was completed, and plans made for the planting of colonial gardens. It is planned to have this entire development completed before the commencement of the George Washington bicentennial celebrations.

The designation of the Eastern National Park-to-Park Highway last April was an important milestone in eastern park and monument developments. This highway connects the Great Smoky Mountains National Park, the Colonial and George Washington Birthplace National Monuments, and the proposed Shenandoah and Mammoth Cave National Parks.

The Mather Memorial Parkway in the State of Washington, through the efforts of the Rainier National Park Advisory Board and State and national cooperation, is now a reality. This is especially gratifying since the project is one in which Director Mather took a keen personal interest during the last months of his service activity. A bill signed March 4 authorized a memorial to Mr. Mather in the park system of the District of Columbia.

I am very proud of our low fire record, for we have gone through a year of grave hazard, due to the cumulative effects of one extremely dry summer followed by another, with the intervening winter one in which the precipitation in the northern parks was only about half the average. Considering these conditions, and the fact that fires have raged in country adjacent to the national parks, conflagrations have been held to a minimum within park boundaries. Although the expenses incurred in fire fighting were much above the normal, they are far below what they would have been in such an unusual season were it not for the intensive study and development of fire prevention and suppression methods during the past few years.

INSPECTIONS OF THE NATIONAL PARK AND MONUMENT SYSTEM

Under the leadership of the acting chairman, Hon. Frank Murphy, of Ohio, the subcommittee of the House Appropriations Committee in charge of the Interior Department appropriation bill made two western trips after the adjournment of Congress on March 4. On the southwestern trip in April and May the committee inspected the Mammoth Cave project, Hot Springs, Carlsbad Caverns, Mesa Verde, and Grand Canyon National Parks, and the Aztec Ruins, Petrified Forest, and Casa Grande National Monuments. Senior Assistant Director Demaray accompanied the party.



OFFICIAL INSPECTION OF NEW SEWAGE SYSTEM IN YOSEMITE VALLEY,
YOSEMITE NATIONAL PARK



TUNNEL ON NEW WAWONA ROAD IN YOSEMITE NATIONAL PARK, 4,230 FEET
IN LENGTH, IS NOW NEARING COMPLETION



GENERAL VIEW OF YORKTOWN, SHOWING THE CENTENNIAL MONUMENT AND
THE SHORE OF THE YORK RIVER



SCENE AT CELEBRATION FIELD DURING THE SESQUICENTENNIAL OBSERVANCE
OF THE SURRENDER OF CORNWALLIS AT YORKTOWN

On its second trip I joined the committee, which visited, in June and July, Rocky Mountain, Zion, Bryce Canyon, Grand Canyon (North Rim), Sequoia, General Grant, Yosemite, Lassen Volcanic, Crater Lake, Mount Rainier, and Mount McKinley National Parks. Illness held me in Alaska when the committee returned to the States, but its members visited Grand Teton Park and the Sunrise Ridge section of Mount Rainier Park before turning home in mid-August. Many Indian reservations and reclamation projects were also inspected on both trips. The Hoover Dam project was inspected July 3 en route to California.

The committee worked continuously, carefully studying the 1933 estimates on the ground, and gained a very comprehensive view of our plans of the present and future and our accomplishments in improvements already completed or under way. The members of the Appropriations Committee making one or both of these trips were Congressmen Frank Murphy, of Ohio; B. L. French, of Idaho; J. W. Byrns, of Tennessee; E. T. Taylor, of Colorado; and W. W. Hastings, of Oklahoma. Several members of the Public Lands Committee of the House also made the trips just described. They were Congressmen Don B. Colton, of Utah; A. T. Smith, of Idaho; Scott Leavitt, of Montana; and W. R. Eaton, of Colorado. Congressman Robert Luce, of Massachusetts, made the entire second trip and Floor Leader Tilson was in the party from time to time, especially in the national parks of the Southwest.

In addition to the parks visited with the committee I also inspected Hot Springs, Great Smoky Mountains, Grand Teton, and Yellowstone National Parks, the Shenandoah project, and George Washington Birthplace, Colonial, Scotts Bluff, Colorado, and Muir Woods National Monuments.

Several members of the Special Senate Committee on the Conservation of Wild Life Resources visited Mount McKinley, Yellowstone, and Grand Teton Parks. The Senators visiting one or more of these national parks were Chairman F. C. Walcott and Senators Peter Norbeck and Key Pittman.

Inspections by the Secretary have been mentioned. The First Assistant Secretary and the Assistant Secretary visited several parks while on official tours. The Secretary of Agriculture inspected road construction in many of the large western parks.

Representatives of foreign countries interested in the promotion of national parks abroad also visited several of the major national parks. Notable among these were their royal highnesses, the Prince and Princess Takamatsu of Japan, who visited the Grand Canyon and Yosemite National Parks. They expressed amazement at the degree of perfection attained by the National Park Service in preserving the parks, while at the same time making them so thoroughly useful to great numbers of people. Another source of comment was the diversity of accommodations provided for visitors. His royal highness was particularly interested in the campgrounds, since camping is quite foreign to Japanese civil life.

Following the royal couple, the Hon. Mamoru Kishi of Tokyo, Japan, a member of the Nippon Parliament, with Mrs. Kishi, visited the United States by order of the Japanese Government for the specific purpose of studying the national parks. The Japanese

Diet at its last meeting passed laws designating five areas as national parks, and in this connection wished to gain a thorough understanding of the national-park system of the United States. Plans and photographs of national-park buildings, bridges, and roads were furnished Mr. Kishi, through the Japanese consul at San Francisco.

In discussing his impressions at the headquarters office in Washington, Mr. Kishi stated that he believed the success of our national park system was due to the high caliber of its personnel, and expressed the belief that if the national parks of Japan were to be developed successfully, leading citizens of Japan must take a serious interest in them, entering the new Japanese park service even at personal sacrifice if necessary.

NATIONAL PARK STANDARDS

The high standards governing national park establishment and protection were strengthened both administratively and from the standpoint of legislation during the past year.

Two bills enacted into law had a very definite influence on standards. One was H. R. 8534, approved by the President on March 3, 1931, which abolished Sullys Hill National Park in North Dakota and turned it over to the Biological Survey as a game preserve. This park had no place in the system, as it did not conform, in any respect, to established national-park standards. This law sets a precedent for removal of substandard parks from the system. While the Sullys Hill act does not deal with qualifications of new parks, by inference it effectively proclaims what ought not to be a national park.

The other measure was Senate bill 196, approved on January 26, 1931, the Nye-Colton Act, which "purifies" (if we may so express its function) the national park system. As certain of the parks were created, their organic acts contained authority for the Secretary of the Interior to grant certain privileges which, if granted, would have been inconsistent with the purposes for which the parks were established. For instance, mining was permitted in Grand Canyon and Mesa Verde National Parks; summer homes were permitted in Glacier and Lassen Volcanic Parks; and railroads might have been authorized in Lassen, Rocky Mountain, and Glacier. Many of these authorizations were repealed by Senate bill 196, thus placing the national parks affected on a par with others to which such executive discretion did not extend. It does not, however, bring all of the national parks under exactly the same degree of protection. For example, grazing, under the National Park Service act of August 25, 1916, may be permitted in any park except Yellowstone, mining is still authorized in Mount McKinley, and use of farms and homes is allowed in the Great Smoky Mountains Park under certain circumstances.

Our ideals contemplate a national park system of primitive lands free from all present and future commercial utilization, but, like all ideals, they can not be uniformly attained in this day and age. New

national parks are likely to be few in number. In regard to them, there is no reason to believe that it will be any easier to secure ideal organic acts establishing future national parks than it was to attain the ideal in earlier legislation. The Yellowstone Park act set up at once the ideal park. There were a few others, including Zion, Bryce Canyon, and Carlsbad Caverns, but most of the greatest of our parks were created by acts of Congress which met one or more local requirements, either real or fancied.

In the few remaining park projects involving the public domain, there can be no doubt about the advisability of adding their lands to the system. If park status is not accorded them soon it will be too late to do so. In each case the scenic features are outstanding and the project is in every way worthy, but there may be, and probably will be, a local requirement inconsistent with the ideal park that must be met. We take the position that it is better to bring these areas into the system on this basis than leave them with all their natural glory to subsequent general utilitarian exploitation. Such a policy is exactly the one that Congress followed in establishing the present national park system. The same policy has been followed by Canada and other nations. Any other system would probably have netted us just one park, the Yellowstone. Moreover, any other policy, strictly applied to existing parks, would require fatal delimitation of boundaries in order to exclude small areas affected by commercial development prior to the park establishment or under some provision of the organic act. An example is the Sherburne Lake and Two Medicine Lake districts of Glacier Park, both encumbered with irrigation reservoir easements. Another is Grand Canyon, which still harbors mining claims not yet passed to patent.

Other steps taken during the year to strengthen our protective policies in line with maintenance of park standards were announcements clearly stating our stand on control of predatory animals, setting forth our rules against extermination of any species of wild life and against use of poison, and also our restrictions in use of steel traps. We further broadcast our policies on exotic species of flora and fauna, and particularly directed that so far as possible exotic plants in private gardens in parks and monuments be eliminated. Importation of exotic animals and fish, of course, is prohibited. Additional policy statements in line with our ideals will be ready during the coming year.

LAND PHASES OF NATIONAL PARK AND MONUMENT ACTIVITY

Consolidation of the present national park and monument system through the acquisition of alienated lands at strategic locations within their confines and park extensions has been the outstanding feature of the land activities of the National Park Service during the past year.

No new parks were established. In fact, the number of national parks under the administration of the service at this writing is one less than last year, due to the elimination of Sullys Hill. There are now 22 national parks, with a total area of 12,542.46 square miles, or 8,027,216.36 acres.

NEW NATIONAL MONUMENTS

Two new national monuments were established, bringing the number now administered by the National Park Service to 34. The combined area of all monuments in the system under the service is 6,394.31 square miles, or 4,092,363.28 acres.

The Colonial National Monument was established by presidential proclamation on December 30, 1930, in accordance with legislative authority granted the preceding July. Already 1,960.76 acres of land in the area have been acquired. Practically all the lands acquired are in the Yorktown Battlefield area, where the sesquicentennial anniversary of the surrender of Lord Cornwallis, commander of the British forces in the culminating battle of our war for independence, will be celebrated October 16 to 19, 1931. A small tract of land on Jamestown Island is now government-owned, and as opportunity offers and funds are available, it is planned to acquire further areas on the island, in Williamsburg and Yorktown, and along the connecting parkway.

The State of Virginia had made an appropriation of \$100,000 for the purchase of Jamestown Island for donation to the United States as its contribution to the Colonial National Monument. Unfortunately, the condition of the State treasury, due to the financial depression, was such that it was impossible for the governor to comply with the provision that he must certify to the comptroller, in writing, that the payment of the State appropriation would not, in his judgment, create a deficit in the general funds of the State treasury. This, of course, he could not do at this time. He has assured the National Park Service, however, that an item of \$100,000 for this purpose will be placed in the next State budget and will have his hearty support.

The Canyon de Chelly area of 83,840 acres was given national-monument status by presidential proclamation dated April 1, 1931. Canyon de Chelly not only contains ruined cliff dwellings considered by archeologists as among the most important so far discovered in the Southwest, but it is also remarkable from a scenic standpoint, because of its interesting wall sculpturing and unusual coloring.

ACQUISITION OF ALIENATED LANDS

The work of eliminating private holdings within national parks and national monuments was continued and excellent progress made. A million dollars was made available for the purchase of such holdings in the 1931 appropriation act. Of this, \$200,000 was made available immediately, with authority to expend it in full payment of the emergency purchase of certain lands, with the understanding that the funds later would be matched on a 50-50 basis by subsequent donations. The remainder was to be spent only when matched by equal amounts of donated funds. The 1932 appropriation for land-purchase purposes is approximately the same as that for 1931.

Before reporting on land matters of the past year, I wish again to register a vigorous protest against a land acquisition policy which demands that the land-purchase fund be met on a 50-50 basis by private funds. The generosity of private individuals in aiding in the purchase of these lands is greatly appreciated by Government

officials and conservationists generally, but the service should not be placed in the position of having to solicit funds from private individuals for this purpose. The acquisition of these lands is vital to the efficient and economical administration of the national parks and monuments, and should be treated as a Government administrative problem. At this point I also want to stress the fact that there are a great many other vitally important private holdings remaining in both the parks and monuments which should be acquired without further delay.

In line with the above recommendation, the National Park Service is making a thorough survey of the alienated land situation and will soon have worked out a definite program of land purchases. At the present time it is estimated that there are 95,138.60 acres of alienated lands in all of the national parks and monuments.

Meanwhile, during the fiscal year ended June 30, 1931, private-land purchases involved 81 separate transactions at a total expenditure of Government funds amounting to \$749,204.86, and brought 8,917.82 acres of land into Government ownership. By the end of the 1931 fiscal year all of the 100-per-cent money, both for the 1931 and 1932 fiscal years, had been spent or allocated. The incurring of obligations against the remaining balance of 50-per-cent money, amounting to \$548,915.27, will be deferred to future years as a measure of cooperation in the President's economy program.

Yosemite.—The acquisition of the Cascade property in Yosemite National Park was one of the most important purchases of the year, since it marked the final elimination of all private lands on the floor of Yosemite Valley. Negotiations were also conducted for the acquisition of several other important tracts of land in this park, but none of these were actually consummated.

Another Yosemite project of importance involves certain private lands in the Wawona region just outside the park, for which negotiations are now in progress under authority granted in the appropriation act of 1932. Further authority was given for the addition of these lands, when purchased, and 5,664 acres of public lands in the vicinity, to Yosemite National Park by presidential proclamation. Topographically this area belongs in the park. Its addition will afford better game protection and will also protect the Wawona-Mariposa Road now under construction.

Rocky Mountain.—Rocky Mountain National Park profited by the elimination of private ownership of the Horseshoe Inn property. Negotiations for acquiring three other holdings which are seriously affecting park developments are in progress. Because of the many private holdings within the authorized boundaries of this park, it may be many years before they can all be extinguished and the boundary lines properly worked out.

Glacier.—Efforts were continued to relieve the situation in Glacier National Park, where the many private holdings have always more or less handicapped administration. As reported last year, it was found necessary to allot \$198,000 out of the \$200,000 of the 100 per cent funds to acquire private holdings about the south end of Lake McDonald. This year, out of the 1932 appropriations, approximately \$55,000 of the 100 per cent fund has been allotted for this purpose. When all deals under these allotments have been con-

summated, the menace to park administration in the Lake McDonald region will have been largely removed.

Despite these accomplishments, there still remain many sections in Glacier National Park where private holdings require immediate acquisition to prevent damage to important scenic areas and to insure proper control of the park.

Zion.—Eight different properties, totaling nearly 660 acres, were purchased in Zion National Park. These lands were located at the mouth of Zion Canyon and controlled the park entrance. All unsightly structures are now being removed or razed. The service acknowledges with keen appreciation the cooperation of Mr. Carl R. Gray, president of the Union Pacific System, and his associates; also the assistance of the officers of the Mormon Church in Utah, and the individual families who had resided on these holdings for 35 to 50 years.

General Grant.—In General Grant National Park, \$20,000 from 100 per cent funds was expended in the purchase of 20 acres of land which had been subdivided into town lots. The money expended in this instance was returned to the Government in full by the saving of an equal amount of road construction funds through the alignment made possible by public ownership of this tract.

Grand Canyon.—In addition to the privately owned lands acquired throughout the system, some State lands within the boundaries of the Grand Canyon National Park were exchanged for lands on the public domain. The State still owns 24,599.27 acres within the park and it is hoped these will be covered by lieu land selections as rapidly as possible.

There are only a few privately owned lands in the Grand Canyon National Park, but these are located along the Rim Drive and are proving very troublesome. One holding in particular has become a definite nuisance through the erection of galvanized iron structures and the placement of signs thereon. Unless it becomes possible to acquire this property it may be necessary to relocate the drive, at heavy expense, in order to insure proper landscape development and afford visitors a view of the type of scenery they expect to see in the national parks.

ADDITIONS TO EXISTING PARKS AND MONUMENTS

The following additions to national parks and national monuments were made during the year to round out these areas from the standpoint of satisfactory natural boundary lines and to add desirable lands:

Mount Rainier.—Through an extension of the east boundary line of Mount Rainier National Park to follow along the ridge of the Cascade Mountain Range, 34,000 acres were added to the park under congressional authority of January 31, 1931. The top of the mountains makes a natural boundary line between the national park and national forest, and puts the entire watershed on each side in control of one administrative unit.

The inclusion of this new section makes possible the location of a new scenic highway to connect the present park development at Longmire in the southeastern portion of the park with the develop-

ment in the Sunrise area in the northeastern corner. This project has already been approved, the location studies made, and contract let for the construction of the first short section of the road. This new highway, after leaving Longmire, will pass by the Reflection Lakes, down to Stevens Canyon, over the Box Canyon of the Muddy Fork of the Cowlitz River, and then up over the Cowlitz Divide and down into the Ohanapecosh River Basin. From there the highway will continue up the valley to the newly designated Stephen T. Mather Memorial Highway.

Bryce Canyon.—Through congressional action, based upon a special bill worked out in cooperation with the Forest Service and the General Land Office, 22,068.52 acres were added to the Bryce Canyon National Park and 1,266.72 acres of park land restored to national-forest status. The area of the park is now 35,240.08 acres.

Wind Cave.—The boundary lines of the Wind Cave National Park were extended by act of Congress dated March 4, 1931, to include several springs and a right of way for a water main, in order to insure the development of an adequate water system. The total area of the park is now 12,095 acres.

Acadia.—Steady progress has been made in adding land to Acadia National Park. A total of 1,379.30 acres was acquired during the year by private parties and turned over to the Government without cost, bringing the park area up to 11,500 acres.

Monument additions.—By presidential proclamation 11,010 acres were added to the Petrified Forest National Monument, 8.68 acres to the Aztec Ruins, 1,926.35 acres to the Pinnacles, and 1,609,600 acres to the Katmai National Monument.

PENDING BOUNDARY PROBLEMS

There still remain before the National Park Service several important boundary adjustments which should receive favorable consideration in the early future to facilitate good administration and preserve areas of national-park caliber. Prominent among these are the following:

Carlsbad Caverns.—From time to time lands have been withdrawn for study as to the desirability of adding them to the Carlsbad Caverns National Park by presidential proclamation in accordance with existing congressional authority. It is planned this fall, after the close of the tourist season, to have all Carlsbad withdrawals carefully studied so that a definite recommendation may be made to the department as to the lands needed there for park purposes.

Grand Teton.—Last year's annual report outlined at some length the work that has been done by the Snake River Land Co., a corporation organized by Mr. John D. Rockefeller, jr., to purchase and manage ranch properties in the Jackson Hole, pending their final transfer to the United States for park and game-preserve purposes. Over 30,000 acres of these lands are now ready for transfer to the United States for addition to the Grand Teton National Park when Congress shall have enacted the necessary legislation.

Yellowstone.—The final report of the Yellowstone Boundary Commission, based on inspections of areas involved in the proposed adjustment of the southeast, south, and southwest boundaries of Yel-

lowstone National Park, was submitted to Congress by the President and printed as a congressional document.

The retention of the Bechler River Basin in the park was definitely recommended by the committee in this report.

It further recommended the addition to the Yellowstone of about 52,480 acres of land directly south of the extreme eastern portion of the park. A minority report submitted by one member agreed with the report as a whole, except that it recommended the addition of the entire Yellowstone River Basin of 217,600 acres to the Yellowstone. This proposed addition would extend the eastern and southeastern boundaries of the park to the Great Continental Divide, making a natural boundary line.

The main report, while recognizing the scenic value of the entire proposed addition, does not recommend the inclusion at this time of the land to the east of the present boundary of Yellowstone Park on the grounds that hunting in this area should be continued under State game regulations.

Grand Canyon.—Conferences were continued during 1930–31 with officials of the Forest Service in an endeavor to arrive at an agreement in boundary adjustments for Grand Canyon National Park. Changes on both the north and south rims are very desirable, in order to bring within the park additional range for the protection and preservation of the native wild animals and also certain areas of native plant life which should remain undisturbed.

A study was made of this area during the past summer by Maj. R. Y. Stuart, chief forester, and it is hoped that a boundary agreement may be reached this fall, and the recommendations thereon presented to Congress through the Departments of Agriculture and Interior.

Kings River.—Further study was made during the year of the project to give the Kings River Canyon park status as a new park which would absorb the existing General Grant National Park. The general consensus of opinion at the present time seems favorable to this project.

The only opposition comes from the Kings River Water Association, a voluntary organization formed to supervise the distribution of the supply of water from the Kings River in accordance with established rights, and to initiate and carry on any activities relating to Kings River water matters. The need for such an organization, and the importance of its work, can be fully appreciated only by those who understand the irrigation problems of the farmers of California's inland valleys and the constant menace of drought conditions that hangs over them.

I personally met the officers of the association just before the close of the 1930 travel year and at that time discussed the park project in detail. Again last July, accompanied by Superintendent White, of Sequoia National Park, and Representative H. E. Barbour, in whose congressional district the area lies, I met the irrigationists and went still more fully into the matter. There is a general feeling of optimism on the part of the proponents of the Kings River Park plan that this new park will shortly be added to the system.



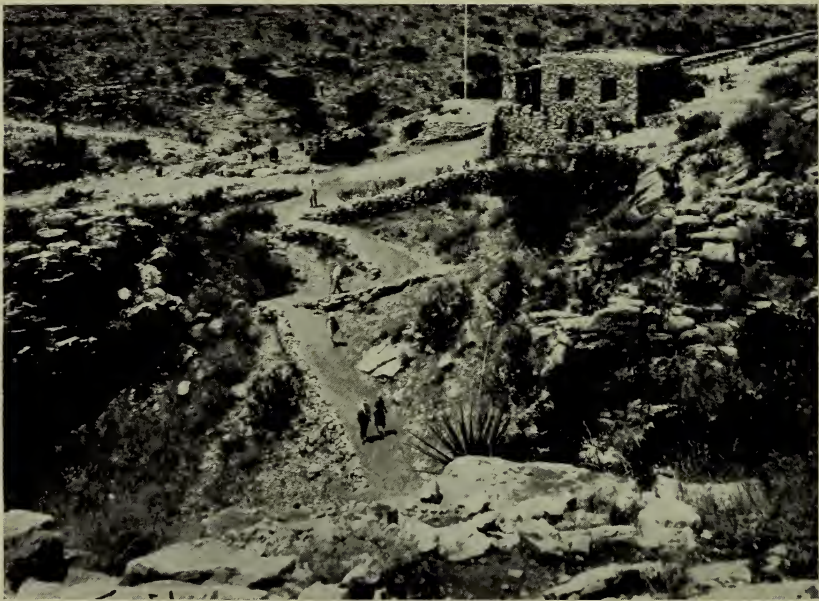
VIEW LOOKING NORTHWARD THROUGH NORTH PORTAL OF PTARMIGAN
WALL TUNNEL, GLACIER PARK



NEW ENTRANCE HIGHWAY, MESA VERDE NATIONAL PARK



NEW TRAIL LEADING TO ENTRANCE TO CARLSBAD CAVERNS



OLD TRAIL LEADING TO CAVERN ENTRANCE

Great Smoky Mountains.—Since the assumption of administration and protection of the 158,876.50 acres of land in the Great Smoky Mountains area that were transferred to Federal jurisdiction by the States of North Carolina and Tennessee in February, 1930, excellent progress is reported in the acquisition of lands by the two States, although no further transfers to the Federal Government were made during the past year.

Informal advices at this writing indicate that title to approximately 170,000 more acres will be transferred to the United States very soon for addition to the present limited Great Smoky Mountains National Park. When this is done, approximately only 100,000 acres more need be acquired to supply the minimum necessary for development of the park. The statute provides that no developments, such as exist for the accommodation of visitors in the western parks, can be undertaken in the Great Smoky Mountains Park, until a minimum area of 427,000 acres has been accepted by the Secretary of the Interior. The lands must be within the boundary lines specified by the Secretary, after a thorough investigation by experts of the National Park Service, and the area must be one contiguous whole, with no private holdings remaining in it.

Great credit is due the commissions of both North Carolina and Tennessee for the able manner in which they have surmounted the many unexpected obstacles which have confronted them with a minimum of friction and without precedents to guide them. Upon their request the service has endeavored to cooperate wherever it possibly could with the responsible State authorities.

Supt. J. Ross Eakin, formerly of Glacier and Grand Canyon National Parks, was transferred to the Great Smoky Mountains Park during the winter and already has done much to expedite plans for future work. It is expected that within a month or six weeks it will be practicable to send engineers and landscape architects into the area to make preliminary plans and studies. All this will expedite the development of the area as soon as such development is authorized.

PARK AND MONUMENT PROJECTS

Outstanding among the park projects before the National Park Service are those in the East which have received congressional sanction, and whose establishment awaits only the meeting of certain conditions, primarily those regarding the acquisition of the necessary lands, laid down by Congress.

Since the Great Smoky Mountains area has passed the project stage and now is listed among the national parks, although still limited in status, it will not be discussed here. For information regarding it, see page 57.

Shenandoah project.—The State of Virginia, having secured, through its commission on conservation and development, a decision from the courts that the special law for acquiring the lands within the boundaries of the tract of 327,000 acres prescribed for the proposed Shenandoah National Park was constitutional, has about completed the work of mapping and valuing these lands. It is confidently expected that by the early part of the year 1932 the commission will be in a position to estimate accurately the amount of acreage

that can be purchased with funds now available from both State and private sources.

Construction of the Skyline Drive along the crest of the Shenandoah Mountains in the proposed park area was undertaken under the emergency public works appropriation, in order that employment might be provided in this section of Virginia which suffered severely from the drought and where resultant unemployment created serious economic conditions. Fortunately plans for road work here could be completed in time to carry on the actual construction with the emergency funds, a condition which did not prevail elsewhere. Should another emergency fund be available for unemployment relief next year, and should land acquisition be far enough advanced in other proposed park areas, undoubtedly similar work will be undertaken in them.

Deeds from the State commission on conservation and development, covering the conveyance without cost of a right of way 100 feet wide and approximately 35.41 miles long, were accepted by the Secretary of the Interior on behalf of the United States for the construction of the new highway. In order to provide the utmost employment the work was divided into two contracts and is now in progress.

Mammoth Cave project.—At the request of the State authorities the Secretary of the Interior in November, 1930, had studied and designated the proposed boundary lines for the Mammoth Cave National Park project.

As this report is going to press the Mammoth Cave National Park Association reports that it has acquired clear title to approximately 20,000 acres of land in the proposed park area, including Mammoth Cave itself. The association also reports that it has anticipated revenue of \$900,000, which it believes will be sufficient to purchase the remaining lands necessary for the consummation of the project. Land purchasing, it states, is progressing better than formerly.

With this excellent report before me I am hopeful that next year I may be able to report the establishment of the Mammoth Cave National Park.

Isle Royale project.—The establishment of the Isle Royale National Park in the State of Michigan, under conditions similar to those governing the eastern park projects, was authorized by act of Congress approved March 3, 1931. The area was studied during August of this year by Associate Director Cammerer, with a view to defining to the State of Michigan just what area should be acquired and tendered to the Government in order to consummate the project. The study was made concurrently with the initial official inspection by members of the Michigan Isle Royale National Park Commission, appointed by Governor Brucker to supervise the acquisition of the necessary acreage.

Following this inspection the Secretary of the Interior certified to the State of Michigan that Isle Royale and all the islands lying adjacent thereto, except Passage Island, should be acquired in this project. The members of the commission are Mr. James MacNaughton, chairman, of Calumet, Mich.; Mr. H. F. Harper, secretary, of Lansing, Mich.; Mr. Edsel B. Ford, of Dearborn, Mich.; Hon. William Alden Smith, of Grand Rapids, Mich.; and Mr. William H. Wallace, of Saginaw, Mich.

Everglades project.—Following the submission of my last annual report, in which was covered the inspection made of the Everglades park project in southern Florida, a favorable report thereon was submitted to Congress by the Secretary of the Interior. Efforts were then made to secure enabling legislation from Congress. The bill passed the Senate, but did not pass the House of Representatives before the termination of the last session. It is understood that similar legislation will be introduced during the coming session, and I earnestly hope that it will receive favorable action and approval. It is a meritorious project of importance to the whole Nation.

INVESTIGATIONS OF PROPOSED PARKS AND MONUMENTS

Eighteen national park and monument projects were investigated during the past year by members of the service staff and reports made thereon to the Washington office.

Despite this progress, at the present time 55 of the national-park projects and 44 proposed national-monument projects await investigation by service experts. While it is believed that many—probably the great majority—of these will not measure up to the high standards of national park and monument establishment, nevertheless it is felt that in justice to the proponents of the projects they should be investigated thoroughly. Most of the investigations of the past year have been made by Roger W. Toll, superintendent of Yellowstone National Park and expert on park and monument standards.

The following is a list of the projects investigated during the year ended June 30, 1934:

Proposed Apostle Island National Park.—Northern Ashland and Bayfield Counties, Wis., along south shore of Lake Superior.

Proposed Bandelier National Park.—Northern New Mexico, including the present Bandelier National Monument now being administered by the United States Forest Service. It now appears that this area should come to the National Park Service as a national monument.

Proposed Death Valley National Park.—East central California.

Proposed Desert National Park.—Several areas have been studied in the Southwest in an effort to locate a typical desert area for national park or monument purposes.

Proposed Everglades National Park.—Southernmost tip of Florida in Monroe, Dade, and Collier Counties. The department has reported favorably to Congress on this project.

Proposed Isle Royale National Park.—An island in the north central part of Lake Superior. Legislation authorizing the establishment of this park has been enacted.

Proposed Kolob Canyon National Park.—Southwestern Utah, near Zion National Park. This area can be made a part of Zion National Park.

Proposed Menominee National Park.—Within the boundaries of the Menominee Indian Reservation.

Proposed Moapa Valley National Park.—In Clark County, Nev., north, south, and west of St. Thomas.

Proposed Navajo National Park.—A section of the Painted Desert; segregated interesting features in the Navajo Indian Reservation and in southern Utah and Arizona. The area includes the Rainbow Bridge National Monument.

Proposed Ozark National Park.—Southwestern Missouri and northwestern Arkansas.

Proposed Upper Mississippi National Park.—Mississippi bottom lands, river bluffs, and natural prairie lands, between Bellevue, Iowa, and Lake Pepin, Minn.

Proposed Comstock Lode National Monument.—Virginia City, Nev.

Proposed Fort Atkinson National Monument.—Winnebago County, Iowa.

Proposed Great Sand Dunes National Monument.—Partly within the San Isabel National Forest.

Proposed Meteor Crater National Monument.—Near Winslow, Ariz.

Proposed Tower Rock National Monument.—Small island in the Mississippi River about 100 miles south of St. Louis.

Proposed Virgin National Monument.—Lands surrounding the Hoover Dam and Reservoir, Arizona.

EDUCATIONAL AND RESEARCH DEVELOPMENTS

The new Branch of Research and Education in the Washington office, established just before the preparation of my 1930 annual report, was engaged during the year primarily in directing the improvement of educational programs in the parks, including greater service to the public in the way of lectures and field trips.

Necessarily in its first year of work the greater part of the endeavors of the Branch of Research and Education were directed to field personnel matters, including assisting the Civil Service Commission in oral examinations.

The personnel of the branch was augmented by the appointment of Verne E. Chatelain as chief historian on September 10. Mr. Chatelain comes to the service well equipped, through his many years of experience, to supervise the service's activities, many of them new, dealing with history and archeology.

Joseph S. Dixon, an able student of animal life, who has been engaged on a wild life survey of the national parks, personally financed by George M. Wright, was placed on a permanent basis as field naturalist. His connection with the wild life survey will remain unchanged.

With the establishment of the Colonial National Monument a new program dealing with the colonial history of the United States was initiated. Two assistant park historians were appointed at the monument to carry forward plans for interpreting colonial history to its many visitors. The forthcoming sesquicentennial celebration of the surrender of Cornwallis at Yorktown will afford a fine opportunity to test the usefulness of this new program.

The George Washington Birthplace National Monument and several of the southwestern monuments deal directly with history and need historical programs of a kind similar to that being worked out for the Colonial National Monument.

The Educational Advisory Board continued to give helpful advice on difficult problems. A meeting held on February 21, 1931, recommended further museum development in Mount Rainier, Glacier, and Grand Teton National Parks, legal provision for a trust fund committee to handle endowment funds, new and improved relief maps for use in the various parks, and the change of the name "Branch of Education" to "Branch of Research and Education." Funds are being sought to carry out such of these recommendations as require financial outlay.

Dr. John C. Merriam, chairman of the board since its establishment, resigned this position during the year because of increased work in other activities. Dr. H. C. Bumpus, of the American Association of Museums, was appointed to the chairmanship. Mr. Waldo G. Leland, a historian of high standing, was appointed to fill

the vacancy on the board caused by the resignation of Doctor Merriam.

A forward step in organizing the field naturalist work was the appointment of an experienced park naturalist to cover the southwestern monuments. Most of his time during the summer was devoted to the Petrified Forest National Monument, but plans for organizing ranger naturalist work in the other monuments will be developed during the coming year.

THE EDUCATIONAL PROGRAM IN THE PARKS

Educational programs were augmented in practically all of the parks. With the appointment of a park naturalist in Hawai'i National Park, work here took on an organized aspect. Likewise in Lassen Volcanic National Park the responsibility of developing a program was fixed and a beginning made. Rocky Mountain National Park for the first time started evening lectures and formulated a program with the appointment of a permanent park naturalist. Campfire programs were begun in Grand Teton National Park and this feature received impetus in practically all of the parks.

Auto trips guided by naturalists, often called auto caravans, continued to hold the spotlight as a new development with great appeal to the public. One caravan, starting at Old Faithful in Yellowstone, contained more than 300 cars and more than 800 persons.

Plans have been formulated to establish naturalist work in Acadia and Carlsbad Caverns National Parks.

Attendance records indicate that for the first time more contacts were made in those parks furnishing educational programs than is represented by the travel records for those parks (see graph on page 139). Field trips to the number of 4,613 were offered with a total attendance of 218,830, of which auto caravans took care of 77,004. Lectures, 6,604 in number, attracted 1,105,354 persons. When museum attendance is added, the grand total of contacts made reached 2,313,821.

MUSEUMS

Though final construction, including landscaping, of the Fishing Bridge Museum in Yellowstone was not completed, the bird room and the geology room were opened to the public early in August. The biology room will not be ready until next summer. "Related story" exhibits have been made a feature of the bird groups. In addition to mounted specimens of the diving birds there are diagrams and explanations of the anatomy which makes these birds excellent divers. Flight mechanism is explained as a "related story" exhibit to the pelican group. Relief maps and diagrams with simple text, prepared by Dr. E. J. Raisz of Columbia University, make plain the geologic story of this region.

The Trailside Shrine at Obsidian Cliff was also opened to visitors. Built of basalt in rustic style, this station is designed to be helpful to every person who wishes to know the origin and interrelations of volcanic glass.

The attractive stone building constructed on the rim of Crater Lake, as a memorial to Representative Nicholas J. Sinnott, of Oregon, from funds appropriated by Congress, was completed dur-

ing the year and dedicated to public use on July 16, 1931, by members of the House Public Lands and Appropriations Committees. The building with its broad parapet looking out over the lake serves as an orientation point for all park visitors. A gift of \$5,000 from the Carnegie Institution of Washington has made possible the installation of instruments and exhibits which will assist the visitor in interpreting the geologic history of Crater Lake. As at Yavapa Station in Grand Canyon, telescopes, specimens, and diagrams will make the geologic story clear. Dr. John C. Merriam, president of the Carnegie Institution of Washington, who is supervising the installation of exhibits, spent some time in Europe seeking ways and means of providing the public with interpretative materials. Installations will not be complete until next year.

The information office and museum erected in Rocky Mountain National Park with Government appropriations was completed and opened for use early in the summer. Among its exhibits are some fine habitat groups of local birds and small mammals donated by the Jonas Brothers, noted taxidermists of Denver. The Colorado Museum of Natural History cooperated in securing specimens and in the preparation of accessories to the groups.

At Mariposa Grove of Big Trees, in Yosemite National Park, the old Galen Clark cabin was replaced with a new replica designed to serve as a museum and information station. A relief model of California at one end of the exhibit room indicates the position of every important grove of giant sequoias.

The Tharp log, a hollow Sequoia log in Sequoia National Park, which was being used by a pioneer as a home when John Muir visited that region, has been restored and contains many interesting historical exhibits.

At the north rim of the Grand Canyon a small museum was established in the tower room of Grand Canyon Lodge. This room was very generously made available by the Union Pacific.

Through the generosity of the Hawaiian Volcano Research Association and Hui O Pele funds, an excellent structure of volcanic rock and metal has been constructed at Uwekahuna Bluff. It consists of a large lecture room, approximately 50 by 25 feet, with adjoining small rooms for office and photographic laboratory space, and a museum room 40 by 20 feet, adjoining which is the seismograph room.

The museum at Longmire Springs in Mount Rainier National Park has been remodeled and the displays greatly augmented and improved. The University of Washington made several donations to the new arrangement of exhibits.

Exhibits in the temporary museum at Grand Teton National Park received new arrangement, and many pioneer relics have been added.

With the completion of the combined new administration building and museum at Petrified Forest National Monument this winter, there will be need for the installation of exhibits to portray the geologic history of this region and to display specimens already assembled in the temporary museum. A museum wing in the new administration building at Casa Grande National Monument will also be ready for occupancy.

At present there is little of interest to the visitor at the Dinosaur National Monument in Utah. Plans now being developed, however, will make this monument of outstanding interest. The plan includes the embossing of an actual skeleton of a dinosaur on the rock wall, the proper housing of it, and the building of roads, trails, and camp grounds. A special committee has looked over the situation on the ground and a cooperative plan has been developed whereby the American Museum of Natural History will do the excavation necessary and the Park Service will handle construction details.

UNIVERSITY FIELD CLASSES

Use of national parks by field classes appears to be on the increase. Oftentimes such trips are to the nearest park, but in some instances a tour is made of many parks with emphasis on ecological studies. Clark University and Western Reserve University parties visited a number of parks, the latter group numbering more than 60. The Princeton geology party under Doctor Field again visited several national parks. The University of Montana summer-session party spent three days in Glacier National Park under the leadership of Dr. Charles H. Clapp. The Universities of North Carolina and Missouri sent parties into the national parks, as did a number of teacher colleges. In Hawaii National Park a summer field course was initiated under the direction of Prof. Theo. C. Zschokke, extension forester, University of Hawaii.

YOSEMITE SCHOOL OF FIELD NATURAL HISTORY

From more than 80 applicants, 20 students were chosen—14 men and 6 women—for the seventh session of the Yosemite School of Field Natural History. The school is taking on more and more a national aspect. The 1931 class came from 11 different States, 9 hailing from east of the Rockies. Greater emphasis is being placed on this school as a training ground for those interested in National Park Service work. Consequently time is devoted to the ideals, policies, and administration of national parks. Dr. Ralph W. Chaney, paleontologist, and Prof. E. O. Essig, entomologist, from the University of California, helped in the instruction work.

JUNIOR NATURE SCHOOL

The junior nature school, started in 1930 in Yosemite as a means of giving special instruction to children, was continued in 1931. Several parents stated they had settled down in the park for the summer because of the opportunity afforded their children. The results attained indicate that nothing is of more interest to children than the study of living things.

The numerous troops of Boy Scouts and Girl Scouts which visit the parks might well be considered special groups gaining knowledge of nature and nature's laws. These groups make continuous use of the naturalist service, both for leaders of field trips and for campfire talks. From the museum displays they gain much information found valuable in field studies.

FIELD HEADQUARTERS

Quarters furnished by the University of California have been made more adequate. More office room, a photographic dark room, and more storage space have been provided. The staff, in addition to routine, has concerned itself largely with plans and specifications for museum displays and in their actual installation. Senior Naturalist Hall spent several days in the Washington office and visited a number of eastern museums, where he secured fine advice and cooperation. A group of Eagle Scouts under his supervision aided in the development of a number of important displays in various parks. Installation of exhibits in Fishing Bridge Museum in Yellowstone was under the charge of Field Naturalist Carl P. Russell and was partly completed in the summer of 1931.

LIBRARIES

Small reference libraries are to be found in most of the major parks. In only a few instances, however, has it been possible to supply a public reading room. In Yosemite and Mesa Verde very attractive libraries are available in the museum buildings throughout the year. Yellowstone has developed a fine technical reference library much used by the staff, but thus far not open to the public. With the increase in use of the park educational facilities by field classes from colleges, universities, and high schools, it is becoming essential that complete reference libraries be available in all major parks. A committee of the American Library Association, headed by C. E. Graves, has made a survey of needs in the various parks and is planning important developments in this field.

NATURE TRAILS

The nature trail, carefully selected and marked, is proving an efficient method of helping visitors to get acquainted with interesting geologic and biologic features. There are many who prefer studying things quietly by themselves, and labeled rocks, trees, and plants make this possible.

In Yosemite National Park short trails have been built and labels placed to indicate the best locality in which glacial polish and striæ may be seen. In Grand Canyon National Park rock formations, fossil footprints, and other important exhibits in place along the trail sides have been marked by enameled metal signs.

LIVE ANIMAL DISPLAYS

One of the prime features of the park continues to be the display of wild life. Wild bears to be seen at the bear-feeding platforms draw thousands of people. Tame elk, antelope, deer, and mountain sheep keep the amateur photographer busy. Wherever a close view of animals is possible there the park visitors foregather.

Two mountain lions and a paddock with elk still attract great numbers of people in Yosemite. Yellowstone's display of buffalo in a corral at Mammoth was much improved this past year by exhibiting both old and young animals. Eventually it is planned to have better quarters for this display. Exhibits of live reptiles were available for study in several of the parks.



THE FISHING BRIDGE MUSEUM, AUGUST 21, 1931
View from the south. Ranger-Naturalist's residence on extreme right.



ENTRANCE TO THE ROCKY MOUNTAIN MUSEUM
Administration building (background) contains laboratory and photographic dark room.



DISPLAY OF PUBLICATIONS IN SPANISH INDIAN CABINET IN MESA VERDE
NATIONAL PARK MUSEUM PRODUCED INCREASED SALES



DETAILS OF INTERIOR OF MUSEUM AT ROCKY MOUNTAIN NATIONAL PARK

WILD FLOWER DISPLAYS

Experiment has shown that it is possible to exhibit wild flowers growing normally in a botanic garden and there is a tendency to develop this sort of display rather than the usual cut-flower show of wild flowers. Several successful gardens have been started. Another year will see a very extensive botanic garden of this type, the gift of Miss Marjorie Montgomery Ward, developed behind the Yosemite Museum.

SCIENTIFIC RESEARCH

Even with the continual help of other Government bureaus in attempting the solution of acute problems involving scientific advice, the problems have become so numerous that the National Park Service has found it necessary to undertake the solution of some of them itself. The intention is not to duplicate scientific work done elsewhere but to gather the scientific information necessary to the development of the museum, educational, and game administration programs of the national parks.

ANIMAL PROTECTION STUDIES

Joseph Dixon, field naturalist, George Wright and Ben Thompson, park naturalist aids, working under funds partly provided by Mr. Wright, have continued to gather data on the major animal problems of each park, to solve problems needing immediate attention, and to help in formulating general wild life policies. Special studies have been made of damage by deer, by bears, by porcupines. Because the trumpeter swan has been near extermination, the finding of several nesting pairs in Yellowstone led to careful studies of the means to be taken to give them better protection. District rangers are required to report all swans seen and local rangers regularly patrol nesting grounds so as to give the most careful protection to breeding birds. The Park Service feels that in giving special protection to the trumpeter swan it is fulfilling one of its major duties—that of helping to preserve for future generations the wild life of the Nation. The wild life survey has gathered data on 150 species of birds and 110 species of mammals, and at the same time has obtained 1,445 photographs which will become the basis for a progress report and for the contemplated wild life division needed to handle adequately the many problems which arise in the field. A full report of the wild life survey appears on page 148.

The cooperative elk survey supported by the Biological Survey, Forest Service, Montana Fish and Game Commission, and the National Park Service, has been continued. William Rush, in charge of the investigation, has worked out migration routes, life history, and forage requirements of the Yellowstone elk. His well-illustrated reports have been most helpful in fixing management policy. This work is proving so valuable to the Park Service that plans are being made to continue it. The Park Service continues to benefit by the work of Dr. O. J. Murie, of the Bureau of Biological Survey, who has continued studies of elk in Jackson Hole.

OTHER INVESTIGATIONS

With the hope of learning more about earthquakes, experiments with artificial earth tremors were carried on in Yosemite National Park by a group of scientists working under the joint auspices of the Carnegie Institution of Washington and the California Institute of Technology. In one instance at the inner end of the new tunnel on the Wawona Road, several hundred feet underground, charges of several hundred pounds of dynamite were exploded and the vibrations set up registered on seismometers up to distances of several miles. Through these experiments data were gathered as to the velocity of earthquake waves in various kinds of granite, as to the effect of a vertical walled canyon on earthquake waves when they traveled at right angles, and as to the echo in the rock wave when reflected by granite.

On September 5 a special committee met in Santa Fe to formulate plans for an appropriate development program of the notable archeological resources of the recently created Canyon de Chelly National Monument. Taking part in the conference were Dr. Clark Wissler, curator-in-chief of the Division of Anthropology of the American Museum of Natural History; Dr. A. V. Kidder, chairman of the Division of Historical Research of the Carnegie Institution; Earl H. Morris, of the Carnegie Institution; Neil Judd, curator of archeology of the United States National Museum; and Consulting Archeologist Nusbaum. Unfortunately Superintendent Pinkley was taken ill en route to the conference and could not attend.

The plans, suggestions, and recommendations of this advisory committee, based on intimate scientific knowledge accumulated over an extended period of years, will form the basis of our future development plans for this monument.

Dr. W. R. Atwood, of our staff, undertook geological research in Glacier and Crater Lake National Parks during the season of 1931. In the latter park he secured evidence of three glacial stages separated by volcanic deposition. The direction of glacial striae were platted in an endeavor to picture past conditions and explain present-day ones.

Expert advice on entomological problems has been furnished by the Bureau of Entomology; on plant diseases and on forage for wild animals by the Bureau of Plant Industry; on animal life by the Bureau of Biological Survey.

Scientific studies by outside agencies and individuals have been many. Archeological research was continued in several of the southwest monuments. Dr. Herman S. Pepon studied the flora of Great Smoky Mountains; Dr. Ira Edwards, of the Milwaukee Museum, the fossil trees of Yellowstone; Miss Elisabeth E. Morse, the fungi of Mount Rainier; Mr. and Mrs. John L. Sperry, the insect life of Rocky Mountain; Dr. A. E. Douglass, of the University of Arizona, the age of giant sequoias in Sequoia National Park; Dr. W. A. Setchell, of the University of California, the flora of Mount McKinley, where he collected 21 varieties of willow; and Dr. F. M. Fryxell, the geology of Grand Teton National Park. The National Park Service encourages such use of the parks as from these researches come concrete and dependable knowledge of their scientific features.

VISUAL EDUCATION

The demand for visual educational material has continued to grow and effort has been made to increase the material available for loan. Colored lantern slides now available for free distribution number 2,200, of which number 975 have been added during the year. Special coloring by an artist has produced many artistic slides. The park photographer has made many lantern slides from negatives. Seventeen reels of 32-millimeter film and 14 reels of 16-millimeter film are available for loan. Most of these reels have been donated to the service. Sound pictures are being requested by schools, clubs, and organizations desiring to feature the national parks in their programs. It is hoped that funds may soon be available for the production and distribution of such distinctly educational films. Universities, colleges, high schools, clubs, and various organizations throughout the country make constant use of this loan material.

With the transfer of the official park photographer, George Grant, from field headquarters to the Washington office, the photographic department is certain to prove far more valuable to the service and to the public. Mr. Grant has secured several thousand excellent negatives of the parks and is prepared to contribute much to the visual educational program. The service is now in possession of some 8,000 photographs, part of them catalogued and mounted.

Of great help in developing the visual educational work has been the \$5,000 donated by the public-utility operators, to be used in purchasing necessary equipment and supplies and for defraying the salary expense for a clerk to assist in the upkeep of this material. The service has arranged to continue in 1932 the work which the operators made possible during the past year.

Through the generosity of Dr. Frank R. Oastler, the service has obtained numerous excellent motion pictures and colored slides of wild animals in the parks. Doctor Oastler has visited most of the parks, and with his ever-active camera has secured many unusual outdoor pictures.

ANIMAL CONDITIONS

Censuses of wild game are taken annually in each park. Figures indicate that animals are on the increase. (See table on p. 150.)

The herd of buffalo in Yellowstone continues to increase so that difficulty is found in disposing of the surplus animals to avoid overgrazing. Both the northern and southern herds of elk in this park wintered well and are increasing. The hay crop netted approximately 200 tons less than the preceding year which may handicap winter feeding. The number of antelope in Yellowstone has more than doubled in the last 10 years according to counts made, censuses for the last 2 years having shown a total of nearly 650 animals.

The situation relative to moose is most gratifying. These animals are seen more and more frequently along the roads in Yellowstone, not only cows and calves but also the bulls. Moose are particularly abundant in Grand Teton National Park and may be seen from roads and trails. At some of the feeding stations in Yellowstone as

many as 20 grizzly bears may be seen at one time. Black bears continue to be an annoyance to campers at times, but steps have been taken to remedy this. There has been apparently an increase of both kinds of bears.

Deer are enumerated in thousands in almost all of the larger parks. A tame herd has been established in Grand Canyon National Park through transplanting of fawns from the Kaibab Plateau, 15 having been added the past year. From a herd of 60 or more there was a fawn crop of about 16. Were it not for a lack of water the herd could be greatly increased. The small herd of antelope established in Grand Canyon National Park through the generosity of Dr. E. E. Brownell now numbers 19, but its growth has been disappointing and it may be the Tonto Plateau will prove unsuitable.

The mule deer of the Kaibab Plateau, which adjoins Grand Canyon National Park on the north, continue to present a problem. At the request of the Forest Service, a committee of nine men studied present deer conditions on the Kaibab. Mr. Joseph Dixon represented the National Park Service on the committee, and other Park Service men accompanied the party. The investigation covered a period of eight days, June 8 to 15. According to the committee's report, the area is still overstocked and much of the winter range has not recovered from overgrazing by deer. Recommendations included "urgent need for the reducing of the present number of deer," the elimination of stock in excess of permits, continued suppression of predatory animal killing, and "more coordination and cooperation among Federal departments concerned with the solution of biological and economic problems as affecting the management of Federal land and the plant and animal life produced thereon."

The variance in administrative policy within Grand Canyon National Park and the adjoining national forest has provided a difficult problem not yet solved to the satisfaction of those interested in preserving wild life as a tourist attraction. Park Service officials regret that the committee did not have more time to study that portion of the park adjoining the Kaibab Forest and determine definitely whether what appears to be an overgrazed condition of park lands is due to cattle which the Park Service is powerless to keep out of the park, owing to lack of fences, or whether this condition has been caused by the deer.

The Commission on the Conservation of Jackson Hole Elk, first organized in 1927 under the chairmanship of the late Charles Sheldon, held its last meeting in New York on December 3, 1930. Chairman Seth Gordon submitted his resignation and was succeeded by Mr. O. H. Van Norden, Camp Fire Club representative on the commission. The commission reiterated its support of the so-called Winter bill providing for the acquisition of additional hay ranches and winter feeding lands in the Flat Creek watershed of the Jackson Hole. A thorough discussion of the present status of the Jackson Hole elk herd, the scientific work that has been accomplished by the Biological Survey in connection with the management of the elk, and the relationship of the commission's land project to the Rockefeller purchases and Grand Teton Park extension, took place in the session that lasted the entire day. The Commission, which is composed of a

representative from each of the conservation bureaus of the Government as well as members from several outside conservation societies and the State of Wyoming, was well represented at the New York meeting.

The reduction of the numbers of deer in Yosemite National Park by means of transportation to other portions of the park was successful in that less damage to vegetation is to be noted and in that a section of the park where deer were scarce has been repopulated. Fewer bears and cubs were seen and less trouble was experienced. It was necessary to "deport" from one part of the park to another only 14 bears this year as against 48 last year. The experiment of using a few selected dogs contributed measurably to a restraint of depredations by bears.

In Glacier National Park deer and elk wintered well and the fawn crop was large. Feeding was not necessary to keep the elk inside the park, nor were any elk killed by Indians. The count of moose in this park showed 142. Seventy head of mountain sheep were fed during the winter at Many Glacier. Mountain goats seen numbered 139. All in all, wild-life conditions in Glacier are favorable.

In Mount Rainier National Park a pleasing increase in the number of mountain goats has been noted. A band in Van Trump Park that numbered 30 head three years ago now contains 60 head, and like increases are reported for other portions of the park.

Mountain sheep are most numerous in Mount McKinley National Park. Airplane inspection and horseback patrol has resulted in an estimate of between 12,000 and 15,000 animals. Caribou vary in number from a few hundred in winter months to 25,000 during the migratory season. Moose and grizzly bears are thriving and are seen daily along the trails. Foxes, too, are common.

At Crater Lake National Park a colony of beavers was discovered just outside the park boundary, giving the hope that this park may also have an exhibit of these interesting animals.

In Zion National Park deer are gradually appearing on the canyon floor in large numbers. Mountain sheep are known to be on the canyon walls, and on the rim, and signs indicate probable increase in numbers.

In the Great Smoky Mountains National Park deer are exceedingly rare, leading to the belief that restocking will be necessary. It is thought that wild turkeys and ruffed grouse still persist in sufficient numbers to act as breeding stock.

In Hawaii National Park it has been found necessary to reduce the unowned domestic goats which have become so numerous that they are destructive to shrubs and plants. Drives held through the cooperation of the Territorial Board of Forestry netted 2,000 during April and 3,000 in May within the park and adjacent territory to the east. In addition, 736 goats, 28 pigs, and 57 mongooses were destroyed by rangers in the attempt to rid the park of exotic animals and bring back natural conditions.

Rearrangement of the entrance trail to Carlsbad Caverns National Park has provided excellent seats for visitors who wish to hear the lecture and see the evening flight of bats which issue nightly during the summer months. Every one seeing the flight estimates the num-

ber of individuals in the millions. Whether this is correct or not, this display of animal life is one of the most notable ones to be seen in any park.

At the new Yellowstone Lake Fish Hatchery some five aquaria display various local fishes, affording an opportunity for close study of marks for identification. An attendant gives an educational lecture and shows people about the hatchery.

PRESERVATION OF PARK LANDSCAPE

With the increasing use of parks by the public an ever-mounting responsibility is placed upon those directing the development of the national parks. To protect irreplaceable landscape and primitive forests from damage through ill-advised improvements and man-made construction, and at the same time provide adequate tourist and administrative facilities, is the function of the Landscape Architectural Division.

An increase of personnel was granted during the year to meet the enlarged program of road work and to expedite the completion of 6-year plans. There are now 20 architects and landscape architects on the staff.

The Landscape Architectural Division continued to supervise all work affecting the park landscape, such as location of roads and type and location of bridges, buildings, and other structures. This work can not be accomplished by a casual inspection, and one of the needs of the near future is a landscape architect for each park throughout the entire construction season.

The advantages of landscape-planned roads are now apparent to all. Roads, both in alignment and section, now more nearly harmonize with the topography than in the days when they were strictly engineer planned. Besides improving the appearance, the rounding and flattening of slopes treatment has lowered the cost of road maintenance. The cooperation of the road engineers has hastened the results of these policies and of other points accomplished through the insertion of our special-provision clauses in the specifications for various road projects. A variety of buildings, bridges, gateways, and other structures were constructed during the year, each carefully planned for its particular site. The standard of buildings, particularly residences, was raised to a better average than ever before.

Although the park operators undertook few new projects, it was apparent this year that they are considering more carefully the matter of a plan showing future expansion before beginning any actual construction.

The landscape division has in course of preparation a 6-year development plan for each park, which in addition to its major purpose of supplying a definite and orderly basis on which to proceed, will also do much toward the stabilization of employment in the parks. The landscape division of necessity probably looks farther into the future in laying out its plans for work than any other branch of the National Park Service.

PROTECTION OF PARK FORESTS

Measures to protect park forests were necessarily intensified throughout the park and monument system because of the drought conditions which prevailed for two successive seasons and of which the cumulative effect was felt during the past season.

Fortunately the appropriations for this work for the present fiscal year, which began last July 1, were larger, there being a total available of \$170,000, as against \$96,850 for last year. In addition to these amounts there was a fund each year of \$50,000 for fire suppression and reconstruction because of fire or flood destruction or other unforeseen emergencies.

THE FIRE SITUATION

Forest fires were the chief forest-protection concern of the summer, since the succession of one dry summer after another, with the intervening winter one of subnormal precipitation, had greatly increased the fire hazard. Despite these conditions and the fact that terrific fires raged in the general vicinity of the parks, fires within their boundaries were held down to a minimum. This was due to the constant vigilance and untiring efforts of the enlarged personnel and increased fire-prevention methods and equipment made possible only through the increased appropriations of the past few years.

The worst fire situation was in Yellowstone National Park, where the Heart Lake fire burned an area of approximately 18,000 acres, and was fought by 700 men at one time. It was caused by lightning. Most of the other fires were small and were caused by visitors leaving camp fires still smoldering or throwing cigarettes and matches out of car windows before they were completely extinguished.

Many parks sent men out to assist in controlling fires outside their boundaries, especially on national forests, and local Forest Service people and State protection forces rendered valuable assistance by supplying both men and equipment in times of park need. This co-operation even took on an international aspect, when the superintendent of Glacier National Park sent men to assist in suppressing a fire in Canada's adjoining Waterton Lakes National Park.

To this spirit of cooperation, to the foresight of the Bureau of the Budget and Congress in providing increased appropriations, and especially to the determined efforts of the men actually on the fire line, at times in grave personal danger, is due the fact that our fire record this year is an unusually good one. Had the same conditions prevailed a few years ago, before men and equipment were available, I firmly believe that untold fire damage would have occurred to the park forests.

INSECT AND TREE-DISEASE CONTROL

The intensities and trends of insect infestations are endangering the preservation of important scenic values in some of the national parks. Following previous subnormal precipitation drought conditions prevailed in the summer of 1930. Snowfall last winter was abnormally light and a deficiency of moisture again prevailed the past summer. Climatic conditions during the past several years there-

fore have been favorable for multiplication of insects, especially the bark beetle, which attack the forests.

Effective treatment is required on the basis of area-type maps which entomologists can supply only by having adequate funds to conquer the pests which have advanced to an epidemic stage.

The increase in the appropriation for insect and tree-disease control made possible some very essential control work in Yellowstone, Mount Rainier, Crater Lake, Yosemite, General Grant, and Sequoia National Parks, and maintenance follow-up work in Glacier National Park on areas treated last year. This work was done under the supervision of the Bureau of Entomology, except in the case of blister-rust infestation, which was handled in cooperation with the office of blister rust control.

In Glacier National Park insect infestations attacking the western white pine, lodgepole pine, and Douglas fir, have reached an epidemic stage. Depredations have assumed such alarming proportions that concentrated action is imperative. There are three bark-beetle epidemic areas containing 49,915 trees on which control measures have not been possible due to lack of funds. Much of the rapid increase in insect infestations appears attributable to the large forest fires which occurred in 1926 and 1929. White pine blister-rust is also spreading rapidly toward Glacier National Park from Canada.

In Yellowstone National Park conditions prevail which are critical, as evidenced by preliminary airplane and ground examinations. Although the full extent of depredations can not be definitely determined until after the fall surveys have been completed, it is apparent that a minimum of \$50,000, exclusive of cost for surveys and type mapping, is necessary for bark beetle control operations.

PUBLIC RELATIONS AND PUBLICATIONS

Contact with the press was maintained through the division of public relations of the Washington office on matters of general interest and by the individual parks on matters of more local interest. This was done by the release of prepared statements to the press in many cases and by individual contacts in others.

Information regarding the parks and monuments also was disseminated through the preparation of specially-requested magazine and newspaper articles, well illustrated, and by the giving of radio talks. Not only did Park Service officials, both in Washington and the field, give special talks over national and local broadcasting lines, but several times advertising companies giving regularly scheduled programs used national park and monument themes as their main topic. It is hoped that this latter method of bringing the national parks and monuments to the attention of the public may show increased use during the year just starting.

There has been a noticeable increase in the demand for literature regarding the national parks and monuments. Newspapers and periodicals have carried unsolicited notices regarding our various publications which have greatly increased the demand for these booklets, as have the notices appearing in *School Life*, the official organ of the Office of Education of this department.



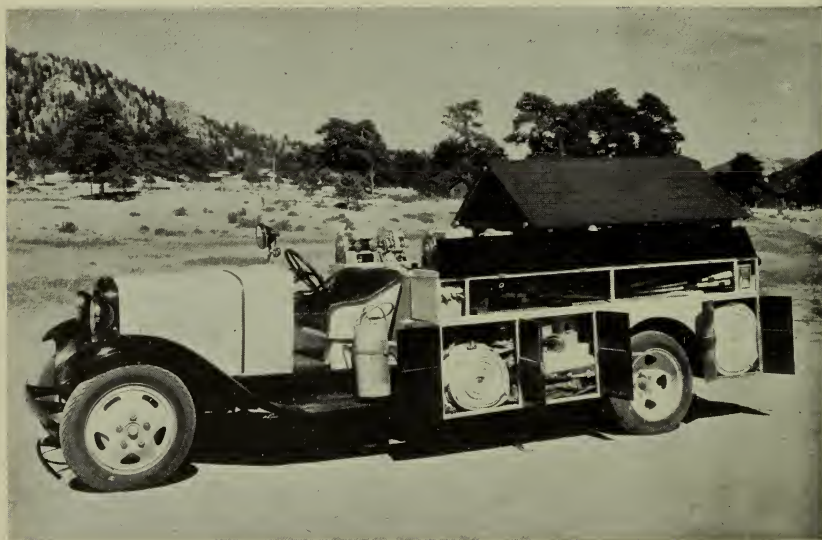
THE FOREST FIRES ON THE SOUTHEAST SHORE OF HEART LAKE, YELLOW-
STONE NATIONAL PARK



PACK HORSES AT BASE CAMP, SNAKE RIVER, LADEN WITH SUPPLIES FOR
FIGHTING HEART LAKE FIRE



FIRE EQUIPMENT SHED AND FIRE TRUCK, ROCKY MOUNTAIN NATIONAL PARK



THE SAME FIRE TRUCK, WITH DOORS OPEN READY FOR USE

The initial publication of the new Branch of Research and Education, Educational Leaflet No. 1, entitled "How Yavapai Station can help you to understand and enjoy the Grand Canyon" was published in August and sent to the Grand Canyon National Park for distribution. Owing to lack of funds on the part of the Park Service, this leaflet was prepared originally by the Grand Canyon Committee of the National Academy of Sciences and the Carnegie Institution of Washington as an aid to visitors to this unique station. Other leaflets of a similar nature are planned as funds become available.

BILINGUAL PARK BOOKLET FOR PARIS EXPOSITION

At this point I want to acknowledge the cooperation of the various railroads and steamship lines serving the western national parks, either directly or indirectly, which made possible the publication of the bilingual booklet prepared for distribution at the International and Colonial Overseas Exposition now being held at Paris, France. Through the Transcontinental Passenger Association these carriers authorized the preparation and printing of 100,000 copies of the booklet at a total cost not exceeding \$10,000. Preparation of the copy and all details of the printing were handled by the service which approved all bills for payment direct by the association. In addition, plates for the illustrations, including 21 full-page color plates and 4 full-page halftones, were furnished by the railroads.

SCIENTIFIC PUBLICATIONS

There is need for the revision of a number of the scientific publications on the national parks, many of which are out of print and should be brought up to date before reprinting, to keep pace with the fast-moving discoveries in the world of science. Several new scientific publications on the national parks are also vitally needed. While these are handled as sale publications through the Office of the Superintendent of Documents, the National Park Service has to bear the initial cost of plating and printing. The purchaser merely pays for the actual cost of printing his own copy after the finished plates are finally approved, so that the price is nominal on all Government sale publications.

NATIONAL PARKS PORTFOLIO REVISED

The National Parks Portfolio, a profusely illustrated, cloth-bound volume on the national parks and monuments which sells for \$1, was increasingly popular. It was revised during the year to include material on the three national parks and three national monuments established since the printing of the fifth edition. First delivery of the sixth edition was made on August 1. The Superintendent of Documents reports that by September 1 the 10,000 copies which he ordered for sale were all disposed of, and at the present time another edition of 10,000 copies is on the presses. Here again the National Park Service stands all cost of preparation and plating, so that the purchaser gets a very beautiful book for a remarkably low price.

LARGER SUPPLIES OF FREE PAMPHLETS NEEDED

In 1931 the Superintendent of Documents terminated the arrangement which had been in force for several years whereby a supply of our circulars of general information was ordered by him from the Public Printer for sale in lots of 100 or more to motoring organizations, travel clubs, and other organizations desiring to secure more than the few copies the service could spare them. It was found by the Superintendent of Documents that the expense of maintaining this sale supply, with the uncertain demand, did not warrant continuation of the practice.

Under the rules of the Joint Committee of Congress on Printing and Binding this service is not permitted to furnish to any individual or organization more than 50 copies of any one free circular without special authorization. While it might be possible to obtain this special authority, because of the very real need these organizations have for the circulars, the extremely limited supplies of our publications which it is possible to print with present funds do not permit us to give even that limit in most cases. As it is, we are unable to meet all the individual demands upon us for free park literature.

It is most desirable that our printing funds should be increased to such proportions that we could print sufficient park information circulars annually not only to meet all individual needs but also subject to the approval of the joint committee, to furnish lots of several hundred copies to motoring and travel clubs in the vicinity of the parks, which each year get many requests for this material from the visiting public. In this connection officers of the National Park Service have noted at the desks of many hotels in the West supplies of free circulars descriptive of lands under the jurisdiction of other Government bureaus. We only wish authority and funds to supply the booklets to organizations in direct touch with travelers who would use them to the best advantage.

This past year, when it was found that sufficient supplies of circulars could neither be bought nor secured from this office, many automobile organizations took the matter up with the American Automobile Association, which in turn got in touch with the service to see what could be done in the matter. It was thereupon decided that the association would circularize its member clubs, advising them of the conditions and suggesting that all club requests come through it. This was done, and the association, upon being informed of the number of circulars available for such use, advised us of the distribution to be made to each club, based upon their location and travel needs, and even cooperated by typing the labels on which the address and quantity of booklets desired were indicated. The labels were then sent to this office for checking and transmittal to the Superintendent of Documents. This cooperation was of great assistance to the service and eliminated a great deal of detail work.

BOOKS AND OTHER NON-GOVERNMENT PUBLICATIONS

The national-park bibliography is being constantly enlarged. During the past year, as already mentioned, the Portfolio came from the Government Printing Office in its sixth edition. It is a beautiful book and right up to date. It was edited by Miss Isabelle Story, the editor of the service.

"Another Government publication of tremendous importance to national-park visitors as well as to scientists, is the "Geologic History of the Yosemite Valley," by Dr. François E. Matthes of the United States Geological Survey. This is United States Geological Survey Professional Paper 160, which can be secured from the Superintendent of Documents, Government Printing Office, at \$1.10.

In the field of natural history is a book by Dorr G. Yeager, one of our associate naturalists, entitled "Our Wilderness Neighbors," which deals with his observations of wild life in Yellowstone National Park. This book is published by A. C. McClurg & Co., of Chicago.

Another naturalist, Dr. Fritiof M. Fryxell, associated with the National Park Service in the Grand Teton National Park during the summer months, published late in 1930 "Glacial Features of Jackson Hole, Wyoming." This book comes from the Augustana Book Concern, Rock Island, Ill.

At this point mention should also be made of Otto Degener's "Ferns and Flowering Plants of Hawaii National Park," very attractively illustrated and containing also descriptions of ancient Hawaiian customs and a brief account of the geologic history of the islands. The publisher is the Honolulu Star Bulletin (Ltd.), Honolulu.

"Rainbow Canyons" is a new volume on Zion and Bryce Canyon National Parks and the southern Utah country, by Supt. E. T. Croyen, of Glacier Park (formerly at Zion), and Frank J. Taylor, of San Francisco. The book is printed by the Stanford University Press.

Two more new books from the Stanford Press are by Dama Margaret (Mrs. "White Mountain") Smith, of the Petrified Forest Monument. One is a lively account of **national-park activities** entitled "I Married a Ranger," while the other is a very entertaining, yet serious, portrayal of the writer's observations of Indians in the Grand Canyon country, called "Hopi Girl."

We are glad to mention again at this point the book "Three Scout Naturalists in the National Parks," described in the section of this report bearing on Boy Scout activities.

A very beautiful and exceedingly valuable book is "The Enchanted Lake—Mount Mazama and Crater Lake in Story, History, and Legend," by Stanton C. Lapham, published by J. K. Gill Co., of Portland, Oreg., and the Statesmen Publishing Co., of Salem. It contains a most appreciative account of all features of Crater Lake Park.

In the realm of poetry and art we are especially pleased to note the appearance of two exquisite volumes, one by Elinor Nell Murray and the other by Lou Ella Archer. "Memories of Sequoia," by Miss Murray, is a beautifully illustrated little book of poems. It is published by the Times Mirror Press of Los Angeles. The author's own description, "A nature book in verse," is as fine a short statement of this attractive volume as can be made. Miss Archer's "Canyon Shadows" is an exquisite volume of art and verse bearing on Grand Canyon, Zion, and Bryce Canyon National Parks and several national monuments. The small paintings and drawings that have been reproduced are by Lillian Wilhelm Smith. A copy of this book may be obtained through Miss Archer, Phoenix, Ariz.

In Mount Rainier National Park several enterprising young editors and business men published "Rainier National Park News," a newspaper which appeared weekly during the season, and which contained not only current news of the park but also many articles on history, natural features, and park policies. It is hoped that the venture of these industrious men was successful and will be continued.

PARK ROAD DEVELOPMENT

Excellent progress was made during the year in bringing the highway systems within the national parks to a standard commensurate with the importance of these areas as focal points of concentrated travel and with conditions on the main approach roads.

The Bureau of Public Roads of the Department of Agriculture continued to cooperate in major road construction in the national parks and national monuments except in Mount McKinley National Park, Alaska, where the road work was performed, as in past years, by the Alaska Road Commission under a cooperative arrangement with the National Park Service.

The 1931 fiscal year cash appropriations for road and trail work amounted to \$7,078,800, with additional authority granted to enter into advance contractual obligations to the extent of \$2,500,000. The increase in appropriations was due to the desire of the Federal Government to aid unemployment.

That the various classes of work in the administration of the national parks and monuments offer excellent means for effectively relieving unemployment to the extent funds are made available, especially for construction of roads and trails, is shown by the records of per diem employment during the 1931 calendar year. An analysis reveals the following numbers of per diem employees for the 1931 calendar year: January, 317; February, 334; March, 597; April, 1,527; May, 3,107; June, 4,666; July, 5,300; August, 4,966; September, 4,504; October, 3,251; November, 1,989; December, 823; the average for each of the 12 months amounting to 2,615. The figures through September are actual, while those for the last three months are close estimates.

Excluding funds for emergency construction appropriated in 1931, the 1932 roads and trails appropriation is increased to \$7,500,000 cash and an additional \$2,850,000 authorization for entering into advance contractual obligations, as compared with \$5,000,000 and \$2,500,000, respectively, for 1931.

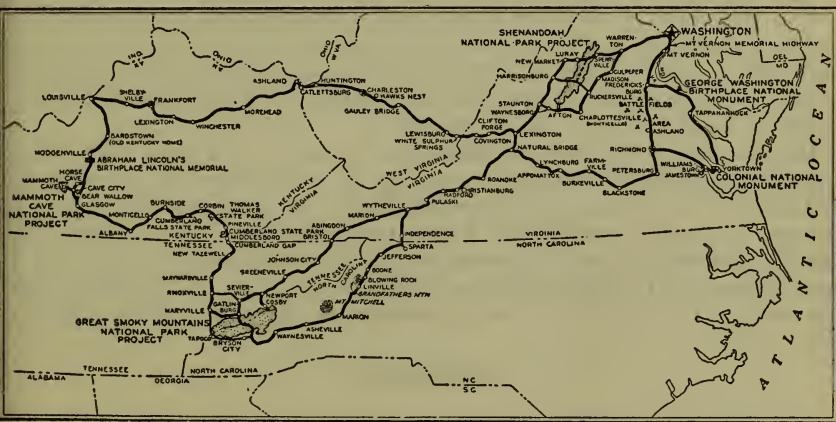
Special legislation authorized the allocation of not to exceed \$1,500,000 of the national park and monument road and trail funds for each of the fiscal years 1932 and 1933 for construction, reconstruction, and improvement of national park and monument approach roads which cross lands wholly or to the extent of 90 per cent owned by the United States. As the primary value of these roads is to carry national-park travel, and as they cross lands almost wholly owned by the United States, the cost of construction is properly being borne 100 per cent by the Federal Government. The expedition of the construction of these approach roads will result in securing, in the

shortest possible time, the maximum usefulness of the road systems being constructed in the parks.

Very favorable operating conditions obtained throughout the 1931 working season. Climatic conditions were excellent; productivity was increased through the availability of high-class workmen; and it was possible to make unusually good contract placements under the competitive conditions which prevailed.

To insure the economical and effectual carrying out of highway development in the next few years, programs of future construction projects have been carefully prepared and are constantly being perfected. Advance surveys are undertaken on a schedule devised to insure the most advantageous results.

Indian labor, both skilled and unskilled, was used wherever practicable in connection with road construction. The use of this class of labor is constantly increasing, in accordance with the expressed policy of the National Park Service and with the experience of local park and highway officials who find the near-by Indian reservations offer an excellent potential source of good material.



EASTERN NATIONAL PARK-TO-PARK HIGHWAY

MAP PREPARED BY THE NATIONAL PARK SERVICE IN COOPERATION WITH THE EASTERN PARK-TO-PARK HIGHWAY ASSOCIATION

EASTERN NATIONAL PARK-TO-PARK HIGHWAY

An interesting highway development of the past year was the designation of the Eastern National Park-to-Park Highway, to connect the Great Smoky Mountains National Park, the Shenandoah and Mammoth Cave projects, and the Colonial and George Washington Birthplace National Monuments. This highway was outlined in the office of Representative Maurice H. Thatcher, of Kentucky, on April 4, 1931, at a meeting of official representatives of Kentucky, West Virginia, Virginia, Tennessee, and North Carolina. The Eastern Park-to-Park Highway Association was formed at this time with Mr. Thatcher as president.

Those promoting the highway have expressed the hope that it may be extended northward to include the Acadia National Park and the

Isle Royale project, and southward to take in the Everglades if, and when, a park is established in that region; and that eventually it will join with the Western National Park-to-Park Highway.

APPROPRIATIONS AND REVENUES

The appropriations for the National Park Service for the fiscal year 1931 totalled \$12,113,435. Of this amount \$35,500 was authorized in the second deficiency act of March 4, 1931. An item of \$1,500,000 was included for construction, reconstruction, and improvement of roads and trails provided by the emergency public works act of December 20, 1930, together with \$578,800 additional authorized by the President, for increasing employment. In addition to the total appropriated, authorization was granted to enter into contractual obligations for road work up to \$2,500,000. Cash donations to the national parks for the fiscal year ended June 30, 1931, amounted to \$65,157.12. These funds were deposited in the United States Treasury and expended under the same fiscal regulations which govern the expenditure of Federal funds.

For the fiscal year 1932 there was appropriated \$12,754,250, of which amount \$635,000 was authorized in the first deficiency act of February 6, 1931, and \$2,621,000 in the second deficiency act of March 4, 1931. Authority was also granted to enter into contractual obligations on road work up to \$2,850,000.

Despite the downward revision of automobile-entrance fees effective during the 1926 season, resulting in a decrease of revenues to \$703,849.60 as compared with \$826,454.17 received in 1925, and the adverse economic conditions which prevailed last season, the total income derived from the operation of the national parks this past year amounted to \$940,364.79 as compared with \$1,015,740.56 a year ago when, for the first time, revenues reached the million-dollar mark.

DONATIONS

The many friends of the national park and monument system have been as liberal with gifts of lands, money, museum collections, and other valuable educational material as in past years. For their generosity and its stimulating effect on the entire Park Service staff, grateful appreciation is here expressed.

Cash donations amounting to \$65,157.12 have been made to the park and monument work. Gifts of private lands totaling 4,581.04 acres are also valuable contributions from public-spirited citizens and will assist materially in the important work of properly rounding out park and monument boundaries.

The gifts of money are available for a great variety of important park work which is often taken for granted, with little thought of the source of the funds with which it is accomplished. Such work as snow removal, road construction, museum building, mosquito control, trail construction, hospitalization, community-building construction, and purchase of visual educational material is often furthered, and some projects made entirely possible, through funds donated by

friends of the national park and monument system. Their cooperation is a source of inspiration to the hundreds of men and women engaged in national park and monument work.

SANITATION AND MEDICAL SERVICE

As hotel, lodge, and public camp facilities are extended to meet the demands for service occasioned by increased travel, the need for sanitary facilities increases in an even greater ratio. Meeting this need is one of the most important duties of the National Park Service, and to handle it adequately the cooperation of the Public Health Service is invoked. That office for a number of years has detailed one of its most competent sanitary engineers to national park work, and the same arrangement was continued during the past year. The most important developments in park sanitation work are outlined in his report, which appears in Appendix D.

They cover such matters as the installation of sewage plants and sewage-treatment systems, the laying out of sanitation systems for new public automobile campgrounds and new utility developments, examination of water supplies, analyses of water and milk, inspection of food, mosquito control, and related projects.

In addition to the cooperation above mentioned, the Public Health Service details one of its medical officers to serve as superintendent of the Hot Springs National Park, and also operates a free clinic in connection with the Government free bathhouse. Senior Surgeon Hugh de Valin, who served as superintendent last year, was assigned to new duties by the Public Health Service and Medical Director George L. Collins was detailed to Hot Springs.

Hospital service was available in Yellowstone, Grand Canyon, Yosemite, Crater Lake, Sequoia, and Mesa Verde National Parks, and the services of physicians and trained nurses were available in all the major parks during the season.

PUBLIC-UTILITY SERVICE

In the 1930 annual report mention is made of the conference of operators of park utilities, held in Washington in December, 1929, at the call of the Secretary of the Interior. At that time department officials stressed the importance of the operators forming a permanent organization to work together both for their mutual benefit and in the interest of the visiting public. Before the close of the conference a definite organization was agreed upon, and at conferences held in the West during the year the details of organization were perfected.

Last December the operators again assembled in Washington for their first conference as a permanent organization. The proceedings of the conference dealt primarily with the consideration of reports on questions which had been raised the previous year and with discussions of policy matters presented by the operators for clarification. Chief among the latter were the department's policy for the administration of the parks and the public utilities, the relations of the operators with the Government and with each other, and definitions of the rights of operators under their franchises. The results

of the conference were helpful to all concerned and should be of lasting benefit.

The matter of certain overlapping of privileges among operators in Yellowstone National Park, which had been under consideration by Government officials for some time, was satisfactorily adjusted through mutual concessions by the operators concerned. The action taken by these operators eliminated undesirable duplication of service and clearly defined the scope of each operation. This was a fine piece of cooperation.

The 5-year programs of improvement and betterments submitted by the operators early in 1930 were again abated during the current year because business in the parks was considerably below normal. The heavy travel to the parks was due to the increasing number of tourists in private cars who patronized the housekeeping camps or who used personal camping equipment. Under these conditions the volume of business handled by the operators reached the lowest mark in some years. Economies in management and operation offset this discouraging condition to some extent, but little or no profits were earned and in some cases actual losses were sustained.

Despite the unfavorable financial situation, however, some notable improvements were carried through to completion during the year.

The new wing to the Canyon Hotel in Yellowstone National Park was completed. It contains 100 guest rooms, each with bath, and is a distinct addition to the facilities available to the public at this important center.

In Mount Rainier National Park the new lodge and housekeeping development undertaken last year at Paradise Valley was completed and placed in operation early this summer. Similar accommodations were opened to the public at Sunrise Ridge. The plans for each of these developments provide a central lodge with 35 bedrooms, a cafeteria, and other necessary service units. The Paradise Valley plan was executed in its entirety; the Sunrise Ridge lodge lacks the wings containing lobby and bedrooms. There are 275 housekeeping cabins in the development at Paradise Valley and 200 at Sunrise Ridge.

A housekeeping development was completed and opened to the public by the Utah Parks Co. on the North Rim of Grand Canyon National Park. This development completed a well-rounded range of facilities available for accommodation to the public in this area and will be much appreciated by private car tourists. The installation of housekeeping accommodations on the North Rim has emphasized the need for similar developments in Zion and Bryce Canyon National Parks and it is expected that these will be provided in the near future.

Since July 1, 1930, four major 20-year concession contracts, one covering the operation of a general store and three for bathhouses and hot-water privileges, were negotiated and completed; 75 miscellaneous permits were issued or renewed for various activities and uses in the national parks and monuments.

HOUSEKEEPING CAMPS

There is a steadily increasing demand for cheap housing facilities in the national parks, preferably in or near the camp grounds. Where



HOUSEKEEPING CABIN DEVELOPMENT IN MOUNT RAINIER NATIONAL PARK
Newly-opened Sunrise Area



NEW WHITE RIVER ROAD TO SUNRISE WINDING THROUGH FORESTS OF ALPINE
FIR AND MOUNTAIN HEMLOCK



HAMILTON'S STORE, OLD FAITHFUL AUTO CAMP, YELLOWSTONE NATIONAL PARK



INTERIOR OF HAMILTON'S STORE, OLD FAITHFUL AUTO CAMP

this demand has not been met in a park, or has been met in part only, gateway towns adjacent to the park boundary line have installed these facilities. These outside interests are, of course, directly competitive with our park operators. The unfortunate part of this competition is that the owners of the outside camps, in their zeal to secure and hold business, have a tendency to unfairly criticize park facilities, charging that park rates are high, that accommodations are scarce, that bears are troublesome, that regulations are onerous. There seems to be no way to combat this propaganda.

There is no legitimate argument that can be made against rates for any park service. We keep rates to the lowest possible level consistent with a fair return to the operator. Charges about dust, troublesome animals, and regulations are without any foundation whatever, except that bears are seen about park camp grounds whereas they are shot on sight outside of the parks. Bear depredations are really very rare. Stories of property damage as a rule grow out of confusion with accounts of bear bites, and these in turn are in most cases the outgrowth of feeding from the hand, a practice which the Park Service endeavors by every means open to it to prevent. Curiously, visitors even when bitten by bears are more inclined to accept slight injury as a souvenir and happily display it than to complain about the offending bear. Nevertheless, bear-bite stories have assisted outside camp enterprises in developing business.

Negotiations are well under way for a contract with the Western Pacific Railroad Co. to provide lodge and housekeeping accommodation and transportation facilities in Lassen Volcanic National Park. The completion of this contract will bring a new public utility operator into the national parks. The tentative plans of the Western Pacific Railroad Co. call for an initial expenditure of approximately \$275,000 in providing facilities for accommodation of the public.

Plans for the expansion of facilities in Mesa Verde National Park are being held in abeyance pending the outcome of our plans to develop an adequate source of water supply. Once assured of an ample supply of water, the Mesa Verde Park Co. is prepared to install new and much needed improvements. A new lodge with central structure and cabin units, all to conform to the pueblo architecture, are on this development program.

AIR SERVICE IN THE NATIONAL PARKS

In 1928 the Scenic Airways (Inc.) established a service by plane between the north and south rims of the Grand Canyon. At that time the trips were made over the canyon from an airport located in the Tusayan National Forest, approximately 18 miles south of the park headquarters. The company operated approximately two years and carried about 7,200 passengers without any accidents. In 1929 the company sold its interests and the Grand Canyon service was temporarily abandoned. In 1930 regular service was offered by another group of operators, who used the airport south of the park and on the north rim landed their planes in VT Park in the Kaibab Forest. Now, the Grand Canyon Lines (Inc.) of Arizona has acquired the interests of the Scenic Airways (Inc.) and is again operating the regular service over the Grand Canyon. We expect to cooperate in making it possible for the company officials to contact the public and

develop interest in their business. A thousand visitors took advantage of this service last summer.

In Mount McKinley Park, Alaska, the operator who has the franchise covering the operation of hotel, lodge, and transportation service is also authorized to arrange for airplane service over the park. The operator's arrangements have been made with Alaska Airways (Inc.), a very efficient concern which maintains a fleet of airplanes, manned by a group of pilots who have splendid records. The planes are based at Fairbanks, but in an hour can reach the landing field on the Savage River in the park. Many tourists avail themselves of this special type of service. I had the opportunity of making two airplane flights over Mount McKinley Park while there during the summer. I can not imagine a finer trip by airplane anywhere in the world than over Mount McKinley Park.

While I still see little if anything to be gained by authorizing airplane service in most of the national parks of the country, I realize fully that in the case of Mount McKinley and Grand Canyon Parks, and perhaps several others, the views from the air are so extraordinary as to make it highly desirable to authorize adequate airplane service for the traveling public. Each request to establish such service will be judged on its merits. It is quite certain that from time to time in the future extensions of the national park air service are bound to be necessary and will be authorized.

WINTER USE OF THE PARKS AND MONUMENTS

The growing interest of the public in winter use of the national parks is an important angle of park work, which, with the increase of road improvements, must of necessity assume an important place in future plans for park development. Good roads are, of course, the essential basis of all such plans. Once they are assured, the possibilities of winter use of the parks appear to be limitless.

Eleven of the national parks are now operated on an all-year schedule. Mount Rainier is open for winter sports, Zion and Bryce are open to motorists carrying their own equipment, and, where roads permit, many of the others are entered by thousands during the winter season. Improved snow-removal machinery has made travel to Crater Lake possible earlier in the spring and later in the fall than ever before. Winter sports events are also held there. With the exception of those in extremely cold areas, the national monuments have impressive winter visiting lists. This is especially true of the 18 monuments in the Southwest, some of which experience their heaviest travel during the winter months.

In spite of light snows during the winter of 1930-31, Yosemite National Park kept abreast of its 1929-30 winter-travel record which broke all previous records and was due chiefly to better roads and increased interest in winter sports. With winter sports at their height, the month of January, 1931, showed an increase in travel over January 1930, of 37 per cent. On Washington's Birthday, 4,462 people entered the park, the largest number ever recorded for a single day during the winter season. In connection with the tremendous popularity of winter sports in Yosemite, it is interesting

to note that during a 3-month period 23,000 persons applied to park authorities for ash-can covers to use for "ash-can sliding."

Important among the winter-sports events held in Yosemite this year were the second annual Pacific coast intercollegiate winter games for the President Hoover cup and the first annual San Joaquin Valley-Sierra winter-sports carnival. Ski tours into the heart of the skiing country, with comfortable camp-style accommodations, were again offered during the 1930-31 season.

Winter travel to General Grant Park more than doubled during the past year. Sequoia Park, where winter sports are becoming increasingly popular, records an increase over the corresponding period for 1929-30. Sequoia and General Grant Parks are the most accessible places in California where visitors can see *Sequoia gigantea* during the winter season, and improved roads will undoubtedly bring about a great increase in winter travel to the park for this reason alone. Little Giant Forest winter camp, with accommodations for 80, was filled to capacity on several occasions, and cars from 40 States other than California were noted during the month of March.

A large number of the estimated crowd of 4,000 attending the fifth annual Crater Lake ski race and snow carnival held at Fort Klamath made the trip from Fort Klamath to the park on skis. Because of improved snow-removal machinery, roads to the rim of the lake were open this year by April 1. The trip was exceedingly interesting to visitors at that time because the road passed through snow banks from 6 to 18 feet high.

The winter use of Mount Rainier National Park increased greatly during the past season. For the month of February, travel to the park increased 38 per cent. Sunrise, the newly developed scenic area in the White River District, offers an ideal location for winter sports. If proper equipment can be provided to keep the road to this area open, Sunrise has extremely interesting possibilities as a great winter-sports area.

Thousands of travelers continue to visit the Grand Canyon during the winter months. During the past February nearly 800 persons attended the geologic lectures, and cars from every State in the Union, the District of Columbia, and Canada entered the park.

From October 1, 1930, to March 31, 1931, approximately 65,000 people were registered at park headquarters at Hot Springs.

A ski meet, sponsored by the reorganized Rocky Mountain Ski Club and attended by about 800 people, was held in Rocky Mountain National Park on March 15. Hidden Valley, on the new Trail Ridge Road, with an elevation of approximately 9,500 feet, is considered an excellent location for a ski hill and toboggan slide, and it is hoped that developments along this line may be made in the near future.

The Zion-Mount Carmel Highway has resulted in increased winter travel to Bryce and Zion National Parks. While figures for visitors to Bryce during the winter season are not available, the winter travel to Zion National Park increased 50 per cent over that for the corresponding period of 1929-30.

Approximately 35,000 more people visited Hawaii National Park during the period from October 1, 1930, to March 31, 1931, than for

the same period in 1929-30. This tremendous increase in visitors was undoubtedly attributable to the volcanic activity during November and December.

Improved roads appear to be the reason for increased winter travel to Wind Cave National Park. The winter schedule of one afternoon trip has been changed to trips at any time between 8 a. m. and 4 p. m. in order to accommodate people traveling through the Black Hills who wish to go through the cave. Approximately 75 cars a day pass through the park.

Winter travel to Platt National Park increased 27 per cent during the past season.

Carlsbad Caverns and Acadia National Parks are also open during the winter.

BOY SCOUT ACTIVITIES

We are always pleased when we hear of parties of young folks making use of park facilities for recreation and education. Boy and Girl Scout parties are among our most welcome visitors in nearly all the parks and in many of the monuments. Space does not permit any full account of young America in the park system, but a few notable events should be recorded. The Great Falls (Mont.) Council of Boy Scouts again sponsored a scout trail-building expedition in Glacier Park during the past summer. Eagle Scouts, 66 in number, from 21 States, in charge of commissioner, North Central Montana Council, E. G. Maclay, constructed 4,000 feet of trail in the Bowman Lake country. This work has been a regular part of our program for many years, and some of our most interesting and beautiful trails have been constructed in part by the Eagle Scouts, the Park Service furnishing to them only materials and equipment, a cook, foreman, and powdermen. The boys are not permitted to touch explosives. They serve without pay but we provide transportation, food, and shelter.

During each of the past three years Senior Naturalist Ansel F. Hall, of the National Park Service, has aided in organizing special groups of boy scouts called scout naturalists, who have visited many national parks and monuments, and have alternated sightseeing with research and exploration, definitely contributing important service in building up our museum collections and otherwise enlarging our educational exhibits.

In July, 1931, the experiences of the 1929 party appeared in a book entitled "Three Scout Naturalists in the National Parks," published by Brewer, Warren & Putnam (Inc.), and which is available at \$1.75. This is a highly interesting and entertaining volume, which is attractive alike to children and adults.

The scout naturalist party this year was made up of 11 scouts of Eagle grade who visited four national parks. Their major work was in Yellowstone National Park, where under supervision of scientists they excavated 11 petrified trees in the Tower Falls region. These have become scientific and educational exhibits in place, as the petrified trunks are standing just where they grew before they were overwhelmed by mud and ashes from a prehistoric Yellowstone volcano.

In Sequoia National Park troops of boy scouts encamped near Giant Forest furnished patrols on the Fourth of July and week ends to assist the ranger organization in traffic control and in dispensing information to visitors. These embryonic rangers from the standpoints of personality, spirit, and efficiency proved to be invaluable to our organization.

STATE PARK PROGRESS

State parks, closely allied to the national parks in purpose and character, continue to show a steady growth, which has been marked during the past year by several developments of exceptional interest. None, perhaps, was of wider public interest than the final acquisition by the State of Kentucky of the Cumberland Falls area. The battle for the preservation of this fine area free from any power development was carried on for six years by an aggressive group of Kentuckians and by a number of National, State, and local organizations outside the State under the leadership of the National Conference on State Parks. The falls with its surroundings was purchased last spring with \$230,000 given for the purpose by the late Hon. T. Coleman du Pont and \$170,000 additional furnished by Mrs. du Pont and other members of the family.

Acquisition early this summer of some 10,000 acres of virgin redwood forest in the famous Bull Creek-Dyerville tract by purchase with funds provided by the Save-the-Redwoods League and the State of California assured the preservation of what many consider to be the finest stand of redwoods in existence. The Bull Creek Grove dedication took place on Sunday, September 13, 1931. The Calaveras Grove Association also raised the \$137,500 needed to match an equal contribution by the State for the purchase of the North Calaveras Grove of *Sequoia gigantea*, and other acquisitions of noteworthy State park areas in California have been made during the year.

Another interesting State park development was the enlargement of the Adirondack State Park, established in 1883, to include Lake George and part of Lake Champlain. Its area is now approximately 4,500,000 acres, including, of course, large tracts of privately owned lands.

Oregon, Wisconsin, Michigan, Iowa, Kansas, Ohio, Connecticut, Alabama, Georgia, and Illinois have all made great or small additions to their park systems.

The National Conference on State Parks, in which the National Park Service has always had a special interest because of the fact that it was established by former Director Stephen T. Mather, continued to enlarge its usefulness in its chosen field. Its 1931 conference was held at St. Louis May 27 and 28. It was attended by several National Park Service men, including myself. After the conference many of the delegates took a 3-day tour of Missouri's State parks in the Ozarks. It is rapidly gaining recognition not only for its influence in promoting the establishment of properly selected parks, but also as a consultant on methods of administration, development, and use. One of the most interesting and useful park

volumes of recent years is "A State Park Anthology," edited by its executive secretary and published less than a year ago by the conference.

THE YEAR IN THE NATIONAL PARKS AND MONUMENTS

In order to conform to the President's policy of economy in Government expenditures wherever possible without resultant unemployment this report has been shortened by the elimination of the reports of the individual park and monument superintendents and custodians, which formerly appeared in the appendices, and instead a brief résumé of the outstanding achievements of the year in each park and monument is given below.

The reports of the several field divisions carrying on specialized work throughout the park and monument system are printed in Appendix D, and for this reason the engineering, landscape architecture, sanitation work, fish culture, and wild-animal conditions are treated but lightly below.

ACADIA NATIONAL PARK

Under the organic act establishing this park authority was given by Congress for its enlargement from time to time as donations of land or money might make this practicable. This park, it should be emphasized, has been created solely from land donated by public-spirited citizens, mostly residents of the locality, or acquired from monies donated for that purpose. Among these donors has been Mr. John D. Rockefeller, jr., who continued to show his interest during the year by presenting for addition to Acadia National Park a gift of land which includes the major portion of the town of Bar Harbor's frontage on the open sea and the southernmost extension of the Champlain Mountain Ridge. This entire mountain ridge is now within the park.

Some other lands, mostly east of Somes Sound, were donated to the Government during the year, primarily by the Hancock County Trustees of Public Reservations, and title to still other lands that have been offered will be studied during the year with a view to acceptance by the United States.

Plans to further extend the usefulness of the Acadia National Park to the public were rendered inoperative, temporarily at least, last year when Mr. John D. Rockefeller, jr., requested permission to withdraw his preceding offer to construct a magnificent extension of the park's present motor road, estimated to cost some \$4,000,000, because of the opposition to the project by a small group of local summer residents. The extension was planned to follow for miles the rocky ocean front of Mount Desert Island, thus making the beautiful coast accessible to the general public. Only $3\frac{1}{3}$ miles of this, however, were to be on park land, the remainder being over land that Mr. Rockefeller had acquired, but which would become available for driving purposes by the general public if the plan went through. At the request of the Secretary of the Interior Mr. Rockefeller agreed not to withdraw his offer at that time, but to let it lie

for a time in the hope that those opposing the project might gain a better understanding of it, and the obstacles in the way of the road building be overcome.

One of the obstacles in the direct location of the road is the present naval radio station at Otter Cliffs. Negotiations are under way with the Navy Department looking forward to the concurrence of that department in its removal and relocation on Schoodic Point without cost to that department. A study made of the availability of the new location on Schoodic Head appeared to indicate most favorable conditions for such transfer, which, when effected, will make available to the public for park purposes what is considered the most beautiful point on the whole island of Mount Desert. Mr. Rockefeller has also donated considerable acreage on this point adjoining the radio station for the purpose of turning this beautiful point into public property as soon as possible.

It is interesting to note that not only are most of the residents of Mount Desert Island in favor of a road extension, but that the State generally has taken a great interest in it, both houses of the legislature unanimously adopting resolutions in favor of the prosecution of the road.

I sincerely hope that nothing will interfere with the completion of this magnificent road project so splendidly conceived by Mr. Rockefeller in the interest of the park and the public, for he has contributed to the enlargement of this park and its facilities with a vision that time will prove to be one of the most outstanding examples of conservation in the entire country.

The town of Bar Harbor, at its annual meeting in March, took action to relinquish to the Government the Ocean Road, which runs through the park and which it has regarded for the last 40 years as one of its greatest scenic assets.

PARK TRAVEL

Again travel reached a new high, increasing from 154,734 in 1930 to 162,238 in 1931. Many times during the year the camp ground at the foot of Champlain Mountain was filled to capacity. The grounds were extended and a community building installed. To keep up with the growing travel it is planned to develop another camp ground on the Seawall tract, which was transferred from the Navy Department to the park several years ago.

ROAD DEVELOPMENTS

The new road to the summit of Cadillac Mountain, the highest point along the eastern coast of the United States, was brought almost to completion. It is hoped to open it formally early next summer.

A survey was made for the proposed road on the Schoodic Peninsula, that portion of the park on the mainland and jutting out into the open sea beyond all other mainland points on the coast. Special attention was paid to the location of the road from the landscape point of view.

A concrete highway, kept open throughout the year, connects Bar Harbor with Ellsworth, 20 miles away and on the main rail line to Canada. Bus service over this road was put into effect last summer.

SCIENTIFIC RESEARCHES

Acadia National Park is rapidly becoming a conspicuous center for biological research and the study of native tree diseases. The Federal Government has been engaged in a pine blister rust work, and State authorities have been making a study of the diseases attacking the birch trees. The Mount Desert Island Biological Laboratory has cooperated in this work.

BRYCE CANYON NATIONAL PARK

Bryce Canyon finished its third year of operation as a national park with much accomplished toward opening up its scenic areas and making them more accessible to the increasing number of tourists attracted there. The park boundary was extended to the south by taking in 3,400 acres of the Powell National Forest and 2,960 acres of public domain. The bill further adjusted the park boundaries by transferring 1,280 acres from the park to the Powell National Forest. The area added is a logical part of the park topographically and contains magnificent scenery. It is hoped that within another year or two this area will be made accessible to travelers by an approach road from the southwest connecting with the rim road from the north which was constructed in part last summer.

Visitors to the park during the travel season ended September 30, numbered 41,572. During the year people in cars used their own camping equipment in the park's one public campground. House-keeping cabins have not as yet been constructed in the area.

Bryce Canyon continued to be administered by the same organization as Zion National Park, although it carries its own separate appropriations.

ROADS AND TRAILS

Construction was started on the rim road project early in the summer and by the end of September was about 50 per cent completed. This road is being constructed under the emergency program of Congress and has been a vital factor in reducing unemployment in this section of southwestern Utah.

The trail system leading into and through the canyon was extended, as was the trail leading along the rim from Sunset Point to Bryce Point. A short bridle path was also built from Bryce Lodge to Sunset Point, to prevent indiscriminate riding, with resultant detriment to the landscape, between the hotel and the rim.

WILD-LIFE SURVEY

A survey of wild life made last summer showed that there were 200 deer and 25 cougars in the park. The Bureau of Biological Survey is planning a drive to exterminate some of the cougars in the vicinity of the park late in the fall, and this should help materially in increasing the deer herd.



SIGN DIRECTING VISITORS TO WINTER CAMP, YOSEMITE NATIONAL PARK



THE NEW RAKER MEMORIAL GATEWAY AT LASSEN VOLCANIC NATIONAL PARK



A CORNER OF THE FISHING BRIDGE GEOLOGY ROOM, YELLOWSTONE NATIONAL PARK



THE BIRD ROOM, FISHING BRIDGE MUSEUM. LOOKING EAST THROUGH THE GEOLOGY ROOM AND READING ROOM

TOPOGRAPHIC MAP OF THE PARK

Mapping of the park was continued by the Geological Survey but field work was not completed by the close of the season. It is interesting to note that prior to the beginning of this work no primary bench-mark levels existed in this section of Utah. Part of the field work has been done by topographic engineers on the ground, and part by airplane photography.

CARLSBAD CAVERNS NATIONAL PARK

The outstanding developments in Carlsbad Caverns during the past year were the construction of a 750-foot elevator shaft, with installation of one passenger elevator and the revision of the underground trails to eliminate most of the stairways. The elevator shaft is sufficiently large to permit the use of an additional elevator when funds for installing it are available. It is planned to use the elevator primarily as an exit and means of handling supplies.

The improvement in underground trails has added much to the enjoyment of visitors and has met with widespread approval. The elimination of the long stairways in particular has added greatly to the comfort of the trip.

There was a slight decrease in travel to the caverns, with 81,275 visitors as against 90,104 in 1930. The greatest travel occurred on July 4, when 1,402 people took the 6-hour trip through the caverns. It was necessary to send the visitors through in two or three groups on the days of heaviest travel. Such travel naturally occurs during the summer months, although the caverns are open throughout the year with a constant temperature of about 56° F. With this equable cave climate the temperature on the surface varied from zero to 108° F. during the past year.

APPROACH HIGHWAYS

Probably 97 per cent of the Carlsbad visitors arrive in privately owned cars, and for this reason good approach roads are vital to the fullest use of the park. Realizing this, the highway commissions of New Mexico and Texas have done excellent work in improving roads, and have kept all the near-by highways open to traffic throughout the year. The State highway north of Carlsbad is in excellent condition and rapid progress is being made on the new State highway between Carlsbad and the park which provides a shorter and more direct route. Highways to the south and east are also being improved.

The shorter route between El Paso and the Caverns was dedicated on January 18 by a motorcade from El Paso, headed by Paul Shoup, president of the Southern Pacific Railroad system. At the present time nearly one-third of the travel is over this route.

"BAT" LECTURES

The bat flight continued to attract public interest to a large degree, and last season lectures concerning these little mammals were given by ranger naturalists during the flight. It is estimated that 3,000,000 bats live in the eastern portion of the caverns in the chamber known as Bat Cave. However, these animals never enter the sections accessible to park visitors.

ACCOMMODATIONS

No hotel, lodge, or camp-ground facilities are available on the small surface area of the park, and none are needed since accommodations of various types are available within a few miles of the park.

PROPOSED EXTENSION

It was found impracticable, during the year just ended, to make a study of the land withdrawn under congressional authority for possible addition to the park. Present plans, however, call for a careful investigation of the entire area during the fall, in order that conclusions may be reached on which to base departmental recommendation for a presidential proclamation enlarging the monument. Since the caverns extend for many miles underground, the surface boundaries of the park should be extended beyond their present area of approximately 1 square mile.

CRATER LAKE NATIONAL PARK

Great interest has been displayed in the newly completed Sinnott Memorial Observation Station located on the rim of Crater Lake. An interesting feature of this construction is the fact that it cost less than the fund of \$10,000 provided for it by Congress. The memorial, erected in honor of the late Representative Nicholas J. Sinnott, of Oregon, who served for many years as chairman of the House Public Lands Committee, was dedicated by members of the present Public Lands Committee and the House Appropriations Committee during July. It is described in detail on pages 17 and 18, under the section on education and research developments.

In spite of some impediments to travel because of approach highway reconstruction, the number of visitors again showed an increase, reaching a total of 170,284. Contrary to the experience in most of the national parks, there was a slight decrease in the number of persons using the camp grounds.

Last winter's subnormal snowfall and the highly efficient snow-removal equipment combined to make the park available to travel earlier than ever before. Visitors were permitted to drive to the rim of the crater on April 1, almost two months earlier than in previous years. Through the use of the rotary snowplow it was possible to keep open throughout the winter the west and south entrance roads, thus facilitating the new road construction.

In order that visitors may enjoy to the full the wonderful vistas of Crater Lake and the opposite walls to be had from the rim, the old Rim Road has been resurveyed and last year the first section, from a point near Crater Lake Lodge to Diamond Lake Junction was put under contract. This portion of the road, about one-third the total distance, follows the lake rim rather closely, departing from it for some distance only where The Watchman and Glacier Peak are encountered. Plans have been made for contracting the second third of the road next summer. The new road is on practically a new location, although in a few places it coincides with the old one.

During construction of the new highway the old road is being oiled and kept in condition for travel.

LANDSCAPE DEVELOPMENTS

Excellent results were achieved in planting and sodding the dusty, barren areas along the rim promenade. This reclamation work has greatly improved the appearance of the rim area through restoring its natural appearance. Roadside clean-up was also carried on with excellent results.

FISHING

Crater Lake afforded exceptionally good fishing during the season. Indeed, it far surpassed any location in the vicinity, even the noted fishing resorts at Diamond Lake and Lake of the Woods. Over 96,000 rainbow and silversides trout were planted last year, through the cooperation of the State Fish Hatchery at Butte Falls, and 200,000 fingerlings have been requested for planting this fall.

ACCOMMODATIONS

Despite a slight increase in the number of housekeeping cabins in the park, there was found to be an insufficient number of this type accommodation to meet the public demand. The housekeeping layout should be expanded as soon as possible, but it is impracticable to urge the public-utility operators to make the necessary expenditure at this time, since its revenues showed a considerable decrease during the past year.

GENERAL GRANT NATIONAL PARK

Continued improvement in general conditions and operation methods characterized General Grant Park during the year just ended.

Work upon the Generals Highway through the park is now under full headway, and good progress is being made. Oiling and widening of county approach roads have contributed to the comfort and safety of visitors. Within the park, limited funds provided for road betterments have permitted needed improvements, chiefly widening and light oiling of the heavily traveled Rocking Rock Road.

The opening of old roads and trails, long neglected and overgrown with brush, chiefly as a fire-protection measure, was continued. All of the 13 miles of old trails are now open to travel.

The public responded to these improvements by visiting the park in increasing numbers. The total amounted to 51,995, a gain of nearly 20 per cent over the preceding year, and this despite several adverse conditions. Cold, rainy weather in June acted as a deterrent to park travel during that month, and two serious forest fires near the park over the Fourth of July holidays also adversely affected travel, especially camping, at a time that heavy travel ordinarily occurs. Out of season travel last winter was nearly 60 per cent greater than a year ago.

The sixth annual celebration of the Nation's Christmas tree was held at noon on Christmas Day at the foot of the General Grant Tree, and brought an attendance of approximately 400 people. Road-maintenance equipment now available in the park will in the future assure easy access to visitors to this annual ceremony.

GLACIER NATIONAL PARK

Outstanding achievements of the past season in Glacier Park are the completion of the trail tunnel through Ptarmigan Wall and the trail to Waterton Lakes, the letting of contracts for the completion of grading on the east side section of the Transmountain Highway which crosses the Continental Divide over Logan Pass, and marked progress in the elimination of privately owned land.

The letting of the final contracts for grading of the Going-to-the-Sun portion of the Transmountain Highway will result in the early completion of one of the outstanding mountain roads in America. Although Glacier will always remain a trail park, the construction of this one highway to its inner wonders is meeting an obligation to the great mass of people who because of age, physical condition, or other reason would never have an opportunity to enjoy, close at hand, this marvelous mountain park.

Early in the present calendar year Supt. J. Ross Eakin was transferred to the superintendency of the new Great Smoky Mountains National Park and E. T. Scoyen, then superintendent of Zion and Bryce Canyon Parks, assumed the superintendency of Glacier.

Although the season showed a decrease in travel from 1930—especially rail visitors—and was rather discouraging to park operators, there were many bright spots in the picture. Significant has been the extensive highway development by the State of Montana, which will result in a large increase in tourist travel through this State in the next few years, and this increase will, no doubt, be reflected in future travel figures of this park. Nothing can be considered of more importance to the future of the park than the aggressive highway policy of this State.

TRAVEL

The number of visitors entering Glacier National Park by all modes of travel during the travel season was 63,497, a decrease of 13.6 per cent from the number visiting the park during the 1930 season. There was a decrease of 28 per cent in rail travel and of 12.5 per cent in motor travel from the 1930 figures.

Camp-ground attendance as a whole has increased 25.7 per cent over the previous season. The Two Medicine camp ground seemed to be a favorite, due to the fact that it is located on a beautiful lake and has very good camping facilities. With the opening of the new camp ground area at Many Glacier with its new sewer and water system, this camp ground will be one of the most popular in the park. Camp-ground attendance on the west side of the park approximately doubled during the 1931 season.

PROTECTION

Throughout the latter part of the summer, forest fires raged in western Montana and northern Idaho. The season was started with the best fire organization in the history of the park, and closed with a loss of only 188½ acres of park timber. The largest fire occurred early in the spring before fires were even expected.

Satisfaction over the fortunate fire record is decreased a great deal when the damage done by bark beetles is considered. It is more

than a probability that the entire stand of white pine and Douglas fir on the west side of the park will be destroyed in the next few years. The problem of the bark beetle alone has developed to an extent where nothing can be done to stop its spread, and, even if this were possible, complications have been discovered which lead one to believe that the beetles are merely one cause of this tree destruction. Fortunately the timber stand consists only in part of these tree species, and, therefore, complete denudation is not in prospect.

TRAIL IMPROVEMENTS

An oiling program was started which includes oiling the most important trails for dust laying. Corrugated iron culvert pipe is being installed in place of small wooden bridges on the trails. It is cheaper and has much longer life.

The Ptarmigan Wall trail, with tunnel, was completed during the summer of 1931 and is now the means of travel for the tourist en route between Many Glacier and Waterton Lakes. This trail winds along the vertical face of the Ptarmigan Wall. The outer edge of the trail is sealed in by a parapet wall, thus removing the mental hazard sometimes experienced by the more timid visitor. The completed tunnel is a solid piece of construction with a 3-foot tread in the center. It is 6 feet wide, 9 feet high, and 183 feet long.

The approaches to the two saddle-horse over-passes over the main highway by the Many Glacier Hotel, the approaches to the equestrian depot, the Bar-X6 trail from the hotel to the stables, the revised section of the Cracker Lake Trail around the southerly side of Mud Lake, and the stone masonry steps to the automobile parking area were completed during the year. Approximately 60 miles of fire ways trails have been constructed during the year. This mileage includes 10 different trails ranging in length from 1 to 8 miles and all located on the west side of the park.

ROADSIDE CLEAN-UP

Roadside clean-up between park headquarters and Lake McDonald Hotel was continued during the fall of 1930 and the spring of 1931. This work included clearing a strip 150 feet wide on each side of the highway through the 1929 burn. Dead and down timber was cleared from along the roadsides between the foot of Lake McDonald and Avalanche Creek.

EDUCATIONAL ACTIVITIES

The naturalist service was characterized by satisfactory and efficient work in connection with lectures and guided trips afield, by further extension of service to automobile camps, and by increase of service in the "high country."

Cut-flower and other exhibits were maintained at Many Glacier, Going-to-the-Sun, St. Mary, Two Medicine, and Lake McDonald. Self-guiding trails were maintained around Swiftcurrent Lake, from Lake McDonald Hotel, and John's and Fish Lakes, and from Avalanche Camp to Avalanche Lake.

ANIMAL CONDITIONS

An exceptionally mild winter with snow fall far below normal cut down winter feeding and game loss. Deer wintered exceptionally well, although a small amount of feeding was necessary. Only about 600 deer were fed last winter. The fawn crop this year will run very high, being estimated at 80 per cent.

Elk wintered exceptionally well on both sides of the park. None was killed by Indians and the few that were lost died of old age. Feeding was not necessary to keep them within the park boundaries as they were able to secure forage in the valleys well within the park. The calf crop is estimated at 70 per cent.

Mountain sheep fared equally well. Seventy were fed at the Many Glacier feed yard. The winter was favorable for a good lamb crop and the increase is estimated at 35 per cent.

From reports of rangers who are finding moose and moose signs in parts of the park not frequented by this animal in the past, it is evident that it now is on the increase.

Although there is no definite information as to the number and increase of Rocky Mountain goats, they are becoming numerous enough to be encountered frequently on the trails by tourists going into the interior of the park and over the passes.

The Bureau of Fisheries made an initial plant of black-spotted trout and landlocked salmon in the Upper St. Marys Lake. This is a large lake and does not, at the present time, provide very good fishing. Plantings of native cut-throat and eastern brook trout were made in all of the larger lakes of the park and in some of the smaller lakes and streams.

ELIMINATION OF PRIVATELY OWNED LAND

The acquisition by the Government of privately owned lands at the foot of Lake McDonald received a decided check this summer. One lakeshore lot was purchased from the Glacier Park Transport Co. Four small deals that were hanging over from last year were closed. The purchase of 160 acres situated midway between park headquarters and the foot of the lake was consummated. However, prices on other properties in this area were too high to even warrant consideration. It is considered inadvisable to purchase any further properties from local residents at the foot of Lake McDonald.

Approximately 1,200 acres of timbered land in the Nyack district of the park were purchased from the Somers Lumber Co., of Somers, Mont., with matched funds, the Great Northern Railway Co. donating half the purchase price.

SERVICE OF PUBLIC UTILITIES

The park operators have rendered a high grade of service the entire season. It is hardly probable, however, that any of them will find revenues in excess of expenses this year and in view of this discouragement very little effort at expansion has been attempted.

GRAND CANYON NATIONAL PARK

The Grand Canyon, one of the most accessible of the all-year parks, enjoyed favorable weather both during the winter and sum-

mer months. Every standard highway to and within the south rim area of the park was kept open and in excellent condition. Responding to these conditions, there was a small consistent gain in automobile travel for nearly every month. Rail travel fell off, however, causing a decrease in the annual total travel to 156,964, a loss of nearly 15 per cent.

PARK EXPERIENCES ITS GREATEST CONSTRUCTION PERIOD

The biggest building construction program in the history of the Grand Canyon was executed last year. A much-needed hospital building was completed and the most important equipment installed. The second floor of the community building, which had to be left unfinished at the time of construction because of lack of funds, was completed and turned into clubrooms with a fund of \$1,200 donated by the local post of the American Legion, its auxiliary, and the Parent-Teachers Association. A wayside museum of archeology was established. A new residence for the superintendent and several cottages and cabins for employees were built. An electric street-lighting system at headquarters on the south rim and an electric system on the north rim were provided.

Road work kept pace with other construction. Two important south rim projects were the completion of the south approach highway on a standard basis with a good travel surface all the way to Grand Canyon, and oil process surfacing of the road from Grandview-Desert View and the spurs to Yavapai Point, Yaki Point, Moran Point, and Grandview Point. On the north rim work is in progress on the Bright Angel-Point Imperial-Cape Royal Drive. The project progressed well until midsummer, when it was found that the quarry material was not holding up in quality. It was therefore necessary to shut down completely pending investigation and resultant selection of a new quarry site. This caused the loss of more than a month's time. It is still hoped that the work may be completed this fall if weather conditions continue favorable.

Reconstruction of the Bright Angel Trail was continued and by the close of the travel year all but a half-mile section and the section from the foot of the Redwall to Indian Gardens had been completed. Standards for this reconstruction are of the same high type as those adopted for the Kaibab Trail. Several footpaths on the north rim were oil surfaced.

Camp grounds were further developed by limited extensions at Grand Canyon village on the south rim and at Bright Angel Point on the north rim and by installation of additional tables and fireplaces. New camp grounds were also established at Cape Royal and Point Sublime, and a picnic ground at Shoshone Point.

Twenty-two standard metal enameled warning, direction, and guide signs were installed along roads, trails, and paths, and in camp grounds. In addition the Arizona Automobile Association furnished standard Arizona Highway Department type signs for the complete signing of the Grand Canyon-National Old Trails—the south approach highway.

All these activities helped to relieve the local unemployment situation. During the summer months an average of 300 men was em-

played on park maintenance and construction projects, including contract work. Considering both park and park-operator activities, Grand Canyon National Park gave employment to not less than 500 persons during the summer months.

APPROACH ROADS

There has been a very gratifying continuation of road work by State and other agencies, in the region immediately adjacent to the park. A half-million-dollar contract was let for construction of the Cameron to Cedar Ridge section of Highway 89. One of the most important pieces of road work accomplished in the Grand Canyon region was the reconstruction of that section of Highway 89 from House Rock Valley to the top of House Rock Hill, as it eliminates a grade which in places ran to 26 per cent and was so rough that altogether it represented a very well-known barrier to travel between the north and south rims of the canyon. Work now is well under way on reconstruction of the 8.4-mile stretch between the top of House Rock Hill and Jacob's Lake junction of Highway 89 and the north approach.

The uncompleted portion of the north approach road within the Kaibab National Forest, lying in the vicinity of Jacob's Lake, remained at the beginning of the 1931 season. The contract for this reconstruction was let late in the fall of 1930 and the work will be completed this season. Between Fredonia and the Utah State line, a distance of a little more than 4 miles, a new road has been constructed.

LANDSCAPE AND RESTORATION WORK

It is a matter of gratification to report that practically all residence shacks on park property were razed during the summer, thus removing an unsightly condition.

In order partially to restore overgrazed areas in the south rim portion of the park and in the adjacent Tusayan National Forest, the grazing period was reduced one month and efforts were made to limit grazing permits. It is especially important, both for proper administration and for unhampered growth of wild flowers and other plants, that a larger area surrounding park headquarters be excluded absolutely from grazing. At present it is not possible to keep cattle out of the village, primarily because of inadequate cattle guards and lack of a suitable drift fence.

POPULARITY OF CAMP-FIRE LECTURE

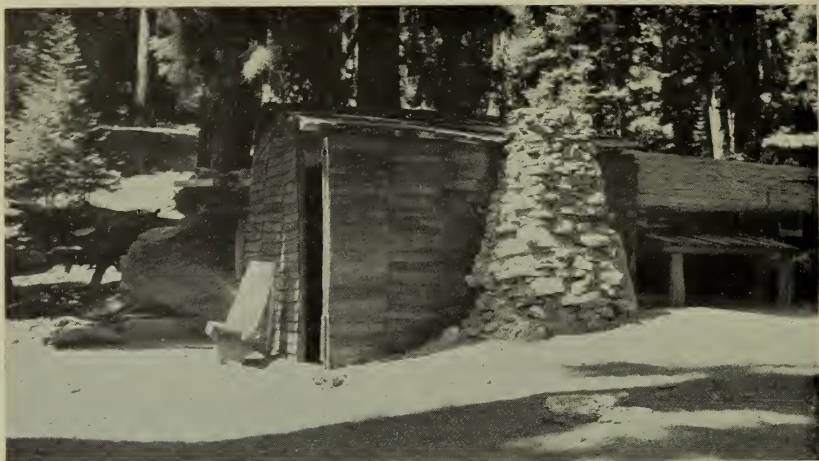
The popularity of the camp-fire lecture ground in the Grand Canyon camp ground has increased beyond its capacity, and plans have been prepared for rearrangement to provide more seating capacity, and for erection of a lecturer's stand. A camp-fire lecture ground at the north rim camp ground was prepared at the beginning of the season. Hundreds of native plants were transplanted in the gardens at Yavapai Point, and the results of much effort are beginning to show here.



THE OBSIDIAN CLIFF TRAILSIDE EXHIBIT, YELLOWSTONE NATIONAL PARK



THREE-LINE TRAFFIC WAY AT NEW WHITE RIVER ENTRANCE CHECKING STATION, MOUNT RAINIER NATIONAL PARK



OLD THARP CABIN, BUILT IN A SEQUOIA LOG IN SEQUOIA NATIONAL PARK, HAS BEEN RESTORED AND IS NOW USED AS A TRAILSIDE MUSEUM



THE GALEN CLARK BRANCH MUSEUM IN MARIPOSA GROVE, YOSEMITE NATIONAL PARK, A RESTORATION OF THE OLD CLARK CABIN

WILD LIFE IN THE PARK

Reference already has been made to the Kaibab deer investigation.

The 15 hand-raised fawns brought from the Kaibab to the south rim last year have done well. The fawn crop this year numbered about 17 so there is now a herd of approximately 60 at the south rim. This is a sufficiently large band to sustain itself satisfactorily by reproduction and lack of watering places will not permit any more importations from the Kaibab for the time being.

The antelope band at Indian Gardens now numbers 19, a slight increase over last year. The growth of the herd has been somewhat disappointing and it may be that the Tonto Plateau will prove unsuitable as a range for this animal.

It has been decided to discontinue all predatory-animal control measures until such time as a change in wild life conditions within the park warrants a different policy. There are many wild horses in the western portion of the north rim and effort will be directed in the future toward ridding this territory of these animals which are encroaching on range belonging to and needed by native wild life.

DESERT VIEW REST ROOM

In line with the usual Fred Harvey policy of providing suitable rest rooms at the termini of scheduled auto trips on the south rim, a temporary but delightful rest room was provided at Desert View, where all visitors, whether patrons of the Harvey Co. or not, were welcome. Located on the rim, its walls were largely plate-glass windows, each framed with molding, so that from inside it gave the visitors the impression of looking at framed pictures of the canyon, a very delightful effect. This temporary rest room is to be replaced during the coming winter by a permanent structure, the motif of which has been taken from one of the ancient kivas or ceremonial rooms and observation towers of the prehistoric dwellings of the Southwest.

AIRPLANE SERVICE

Airplane service was established by the Grand Canyon Air Lines, Inc., an Arizona corporation which took over the holdings of the Scenic Airways in the Red Butte airport. Regular scheduled scenic trips included a 45-minute flight from the airport along the canyon rim to the Little Colorado gorge and return, and across the canyon to the landing field in VT Ranch and return. The company handled a good volume of business. It uses excellent equipment and operates efficiently and carefully. In addition to regular schedules, many special trips were made over the Painted Desert country and elsewhere. Consideration is now being given to a proposition to bring the company's operation under park control by issuance of a concession contract.

GRAND TETON NATIONAL PARK

Grand Teton National Park is one of the most precious possessions of the Nation. Those of us who have had opportunities through the years to see its mountains in winter and spring when covered with

snow, to enjoy its lakes, forests, and streams as well as mountain scenery in summer, and its brilliant garb of frost-touched aspen in the autumn, still with a background of granite peaks and glaciers, have long realized that it is a region exceptionally favored by nature. Now it is fast becoming known to all our people, and it brings great happiness to National Park Service men to hear and read the comments that are made on the beauty of the park by visitors who are just discovering it.

It is a new park, established in 1929, but as yet unfinished. Its limited area inhibits adequate planning for the future. An extension to include Jackson, Emma Matilda, and Two Ocean Lakes, and the upper part of the Jackson Hole from the Gros Ventre River to the Buffalo Fork is inevitable.

In 1927 Mr. John D. Rockefeller, jr., through his Snake River Land Co., organized solely to buy lands in the Jackson Hole north of Jackson and hold it until conveyed to the Federal Government, began the acquisition of homesteads and other private holdings which he intends to turn over to the Nation for preservation. In excess of 30,000 acres have been acquired to date at a cost of over \$1,000,000. The project is incomplete, but has progressed far enough to bring very satisfactory results. It was first launched in 1922 by a group of Jackson Hole citizens who contended that the Grand Teton Park plans were inadequate and that any proposed park not including the valley lands that were the foreground of the mountains and the winter habitat of the larger mammals of the region would not be satisfactory to the people of the valley nor to the Park Service. The contention of the Jackson Hole group was recognized as sound, but there was no fund in sight from which the privately owned lands, mostly ranches, could be purchased.

Years passed and the new road approaching the Tetons brought hot-dog stands, gasoline stations, camps, fences, a rodeo area, telephone lines, and even a modern city billboard with latticework about its edges. The foreground of the Tetons and the approaches to the magnificent range were all but ruined. Mr. Rockefeller, visiting the region, appreciated its sublimity, and from experience envisaged the future impairment of its extraordinary esthetic values. He decided to supply the funds to do the ideal thing—clear out the private holdings on a basis that would not only be fair but liberal, then turn over the lands to the Government for perpetual preservation as a park. Two ends were to be achieved. First, the preservation of the landscape of this exceptionally beautiful region; second, aid to the conservation of wild life, especially elk, through removal of fences and furnishing of more ranch lands for hay production necessary in winter feeding.

AN IDEAL NEARLY ATTAINED

The ideal is now largely attained so far as Mr. Rockefeller can accomplish his noble purpose. Hundreds of buildings have been razed, scores of miles of fences no longer mar the Teton approaches, the landscape is quite clear of obtrusive structures. Transfer to the Government is the next step. Opposition of various types has delayed this action. Wyoming sentiment, through misrepresentation of the donor's aims and ideals, and equally unfair misstatements of

national park policy, has been swayed rather against the plan, despite the fact that the Jackson Hole people themselves, the very citizens most affected by the plan, favor its early consummation.

As this is written, the atmosphere is clearing, and the prospects for early action in Congress seem bright. If and when the plan is carried through, Grand Teton Park will embrace nearly all the valley lands north of Jackson and east to the national forest line as well as a strip including Jackson Lake running north nearly to Yellowstone, perhaps to that park, and west to the Teton divide. The park will have the duty of preserving the landscape of the region and providing adequate recreational facilities, including a splendid trail system, while the Biological Survey, probably with the cooperation of the State, will maintain exhibition herds of native wild life and will continue the care of the elk and other animals in winter.

JACKSON LAKE SHORES TO BE CLEANED UP

During the past year perhaps the greatest achievement of the service in the Grand Teton Park region has not taken place in the park. It is the clearing of the Jackson Lake reservoir and shores of the original lake of dead timber which was flooded when the dam was built. Congress in the 1932 appropriation bill provided \$100,000 for this work, \$50,000 made available to Grand Teton Park and \$50,000 to the Reclamation Service, Minidoka project. The two bureaus have pooled their funds, and let a contract for the work. Supervision of the contractor is handled by the reclamation engineer, while our landscape architect advises on all questions of esthetics. This is about the biggest landscape project of its kind that has been undertaken, and it would be difficult to find one more important.

ROAD AND TRAIL CONSTRUCTION

While this work was under way splendid progress was made in the park in the reconstruction of the road along the shores of Jenny, Beaver Dick, and Leigh Lakes. The roadsides were cleaned of brush, stumps, and down timber and vistas were cut to afford exceptional views of the lakes and mountains. This drive along the lakes was also oil-processed late in July through cooperation extended by Yellowstone National Park which supplied the necessary equipment and experienced men.

Quite as interesting as the fine road work is the achievement in trail construction. Our trail program in Grand Teton Park includes a system of trails connecting the lakes and other features at the base of the Tetons, a trail up the slopes of the Grand Teton to its most accessible glacier, and a series of trails through the glacier-cut canyons to the backbone of the range which when completed will form a series of loops beginning with the Death Canyon on the south and ending with one of the canyons in the northern part of the park. At the present time the Teton Glacier Trail is completed to Amphitheatre Lake. The Indian Paint Brush Canyon Trail is complete to within 2 miles of the head of the canyon. The Glacier Canyon Trail extends 2 miles up the gorge via Hidden Falls, and Death Canyon Trail extends back in the mountains 6 miles, approximately

half the distance from Taggart Lake to the head of the gorge. It is expected that next year Glacier and Death Canyons will be connected with a portion of the Skyline Trail which is the summit route tying in all of the proposed canyon feeder trails.

This trail system is a part of the program of the National Park Service to encourage the use of the Teton Mountains by hikers and lovers of horseback riding. In fact it is the hope of all Park Service officers that the Grand Teton Park will always be attractive to the mountain climber, the pack outfit, the dude ranch guest, and all other vacationists who enjoy life in a wild, beautiful alpine region, kept as primitive as possible.

ADMINISTRATIVE DEVELOPMENTS

It is hoped that all buildings will be of the trapper cabin architecture, a type of design early adopted by our landscape architects in ranger-station construction. This means logs and rocks will be the principal materials of construction. We have not been able to finally locate the headquarters of the park for the reason that the boundaries have not yet been settled. There are several suitable locations for headquarters, any one of which would be entirely satisfactory.

Camp grounds have been extended at Jenny Lake. Water and sewer systems extension, begun a year ago, was completed before June 15. The camp grounds are now sufficiently large to accommodate comfortably about 300 people. Of course there are many other smaller areas which are available for parties wishing more isolation than is usually afforded by the developed camp ground.

WILD LIFE

Special attention has been given to fish planting, in cooperation with the United States Bureau of Fisheries. It is hoped next year to begin the construction of a hatchery and rearing ponds that will supply young trout to all of the waters of the park and adjacent territory.

This has been an exceptionally satisfactory year from the standpoint of the wild life of the park. There was little snow in the Jackson Hole country last winter, and all species of mammals were able to care for themselves on the natural range. There was no feeding of elk by the Biological Survey, which bureau has supervision of the winter care of the wild life in this region. Moose are apparently increasing in numbers in the park, and sheep and bear are reappearing in the Tetons. Both elk and deer, of course, are easily seen, not so much in the park as along the borders but within the area of the proposed enlargement. Several pairs of the trumpeter swan were reported during the season on Jackson Lake.

ASCENTS OF HIGH PEAKS

The Grand Teton was climbed during the 1931 season by 57 people, 5 climbed Mount Owen, and 30 or 40 ascents of lesser peaks were accomplished by enthusiastic mountaineers. Especially notable were ascents of Grand Teton, Mount Owen, and Mount Wister along new routes, all considerably more difficult than the earlier and more established courses.

PHOTOGRAPHIC SHOP

The most important thing to note about the business of the public utility operators in the Grand Teton is the fact that Mr. H. R. Crandall, official photographer, moved his picture shop to the Jenny Lake camp ground. Mr. Crandall's photographs of the Tetons and Jackson Hole have attracted wide attention.

SUPPORT OF JACKSON HOLE PEOPLE

The National Park Service is especially grateful for the support we have had from the people of Jackson Hole, particularly the business men of the town of Jackson. The money that is being expended in the park and the employment of nearly all the available men in the valley, combined with State and Federal aid road work, have brought about very satisfactory economic conditions.

GREAT SMOKY MOUNTAINS NATIONAL PARK

Although development of the area within the Great Smoky Mountains National Park may not be undertaken until a minimum area of 427,000 acres within the prescribed boundaries has been tendered to and accepted by the Government for park purposes, the National Park Service was charged with the administration and protection of a minimum of 150,000 acres when that amount had been accepted by the Government. Title to deeds covering 158,876.5 acres was turned over to the United States in February, 1930, by the Governors of North Carolina and Tennessee, and accordingly a small administrative staff has been installed for the administration and protection of the area. J. Ross Eakin, who has served as superintendent both of Grand Canyon and Glacier National Parks, was transferred to the Great Smoky Mountains Park because of his intimate knowledge of conditions in that region and his proven ability to organize.

STATUS OF LANDS

Informal advices indicate that an additional area of approximately 170,000 acres will be conveyed to the United States before the end of the year. This acreage will include the approximately 95,000-acre tract of what is conceded to be the most beautiful virgin area of the proposed park, which was acquired by compromise between the Champion Fibre Co. and the Park Commissions of North Carolina and Tennessee at a cost of \$3,000,000 after condemnation proceedings had been instituted by the State of Tennessee for the acquisition of the Champion holdings on the Tennessee side of the park. Great credit is due these three agencies for reaching such a compromise in an amicable manner, so that this luxuriant primitive wilderness could be saved for posterity. The Park Commissions of North Carolina and Tennessee have been conducting an unusually difficult and complicated park acquisition program in a highly creditable manner.

The park is being established one-half by the peoples and States of North Carolina and Tennessee and one-half in memory of Laura

Spelman Rockefeller. Assuredly no finer memorial, enduring to the end of time, could have been selected than the conservation of one of the most glorious wilderness sections of the East.

Unfortunately, when the State of Tennessee enacted legislation granting its park commission authority to acquire lands by condemnation within the park area, a small section in the Elkmont and Cherokee Orchard regions was specially excepted in that act from such acquisition. These areas are vitally needed to protect the approaches and complete the park on the Tennessee side, and while the vast majority of the acreage in these sections has been acquired by purchase, there are some sections that must be acquired by condemnation, and additional legislation is needed and is being sought by the Tennessee Park Commission to effect this. This section is so vital from a park standpoint that, in my opinion, the park can not be accepted as completed until this land has been acquired. I am hoping, therefore, that Tennessee will grant the necessary legislative relief.

ROAD CONSTRUCTION

The State of Tennessee's consistent interest in the park project has been shown in many ways, but in none more effectively than in the planning of construction of roads to and within the park area. A plan for a large boulevard from Knoxville to Gatlinburg has been projected, and in this the Park Service is very much interested. Similarly approaches on the North Carolina side from Asheville to the park have been planned.

The service, through its responsible officers, has rendered all possible assistance to the North Carolina and Tennessee Park Commissions whenever requested.

The States of North Carolina and Tennessee have no funds which may be used to protect the lands acquired for the Great Smoky Mountains National Park, but not yet deeded to the Federal Government. The small protective force of four rangers is therefore faced with the difficult task of protecting, or attempting to protect, an area of over 327,000 acres.

FOREST PROTECTION

Protection work in the forests is devoted primarily to forest-fire prevention and suppression. The fire situation in this area is quite different from that of the Western parks, where the summer is the time of greatest hazard. In the Great Smokies there is relatively little danger of forest fires during the travel season, the greatest hazards normally occurring from February 15 to May 15 and from September 15 to November 15, a total period of five months. So far this calendar year the most hazardous period was the last week of January.

Excellent progress has been made in the cutting out of 214 miles of fire trails at a cost of \$35 per mile. The locations chosen have been those to be used later for permanent construction, but only crude trails, passable for pack horses, have been brushed out. When the development of the park is authorized, upon acquisition of the necessary lands, these trails will be rebuilt on modern park standards.

FISHING

Owing to the great rainfall and the dense forests, insuring a gradual run-off, the park area has 600 miles of fine trout streams. Inaccessible waters now provide unusually good trout fishing, but accessible waters have been fished out. To remedy this latter condition an intensive restocking program has been planned. During the year 128,000 rainbow trout and 37,850 brook trout were planted in the streams of the park.

HAWAII NATIONAL PARK

Lava returned to Halemaumau, the firepit of the Kilauea Volcano in the Hawaii Park on November 19. The activity lasted for three weeks, and during that time 25,000 visitors came to view the gorgeous spectacle. Starting first with two fountains bursting through the lava of the pit floor, it was not long before the entire floor was rising and the lava bursting into huge blocks which were thrown high into the air. At times during the flow the great blocks were thrown upward 200 feet.

Further volcanic activity in the Hawaii National Park, either in Kilauea or its towering neighbor Mauna Loa, is predicted by Dr. T. A. Jaggar, volcanologist of the Geological Survey stationed in the park. This forecast is based upon the Japanese earthquakes and volcanic disturbances of the past six months, as the park volcanoes and the Japanese features involved are on the same volcanic rift.

The work of the Volcano Observatory, under Doctor Jaggar, was most interesting to the park. It included the operation of five seismographs about Kilauea Volcano, one in Kona and one in Hilo, operation of weather gauges, and tilt study.

Kilauea's activity and the number of spectators it drew caused a sharp increase of travel, breaking all park records at a time when steamship travel to the islands showed a marked falling off. In all, 24,932 people entered the park.

NATURALIST ACTIVITIES INAUGURATED

A permanent park naturalist was appointed, as well as a seasonal ranger-naturalist, to explain the park to visitors and to conduct them on trips along the trails.

An interesting activity was the nature-study class from the University of Hawaii. Composed of teachers from various schools on the islands and students from the university, it made its headquarters at the Kilauea summer camp. Many phases of natural history were studied. The park staff assisted the teaching staff.

NEED FOR BETTERMENT OF ACCOMMODATIONS

I regret to state that hotel accommodations in the Hawaii National Park as yet are inferior to those established in mainland parks. The lack of hot water, baths, heat, and sufficient electric light in the rooms, coupled with the high rates, has been the cause of numerous complaints. Service officials are urging the utility operators to undertake the amelioration of these conditions at once.

HOT SPRINGS NATIONAL PARK

The main feature of this park being the hot springs and the therapeutic use of its waters, it is gratifying to note that interest in the use of the waters has kept pace with the advances in medical science. This applies particularly to the wide field of various forms of arthritis to which much scientific attention has been recently devoted. Increasing interest in the subaquatic thermal manipulative treatment of various paralyses such as those following anterior poliomyelitis has indicated a future use of the hot springs waters which may prove practical with the increased supply of these waters. This increased supply has been affected by the installation during the past year of a central collecting, pumping, and impounding system.

Medical Director George L. Collins was detailed to Hot Springs by the United States Public Health Service to succeed last year's superintendent, Senior Surg. Hugh de Valin, who was assigned to new duties.

The high professional standing of the National Park Service in architecture and landscaping was recognized by Congress in the act approved June 18, 1930, which provided that in the reconstruction of the Army and Navy Hospital at Hot Springs the exterior design should be approved by the service. This approval has recently been given and it is expected that the construction of the hospital will be rushed to completion. It will become undoubtedly the outstanding structure in Hot Springs.

Approximately 63 acres of land were donated to the Government by Col. John W. Fordyce. On this tract is located an old Indian quarry which is believed to be of considerable value from a standpoint of archeology and ethnology.

Hot Springs National Park still presents to its visitors an unusual variety of accommodations ranging from de luxe modern resort hotels to boarding houses with the most reasonable rates. The recreational advantages are of the highest types. Recent additions have been made to the park system of foot and horse trails, the Country Club has added another 18-hole golf course with grass greened to its existing 36 holes, and additional tennis courts have been provided by the city of Hot Springs.

It is estimated that about 163,394 persons entered the park last year.

WATER SYSTEM IMPROVED

The installation of the central collecting, pumping, and impounding system, a unique engineering achievement, now practically finished, not only adds greatly to the amount of hot water available but by an ingenious system of pipe insulation assures a remarkable retention of heat by water impounded in and delivered from two subterranean reservoirs of an aggregate capacity of 500,000 gallons located on Hot Springs Mountain. The work was done under contract with the Wickes Engineering & Construction Co. of Des Moines, Iowa, under the supervision of an assistant engineer detailed from our San Francisco office.

Numerous repairs and improvements were made to the buildings in the park, and the roads and trails kept in good condition. The



OVERPASS LEADING TO DORMITORY QUARTERS, MANY GLACIER HOTEL,
GLACIER NATIONAL PARK



ON DEATH CANYON TRAIL IN GRAND TETON NATIONAL PARK



THE SILVER SWORD PLANT WHICH GROWS IN THE HALEAKALA CRATER OF HAWAII NATIONAL PARK

On left: Plant in full bloom. On right: Blooms covered with cheesecloth for protection against tyrpetid fly which destroys seeds.



REARRANGEMENT OF PARKING DRIVEWAY AND ATTRACTIVE NEW LAWN AT ZION LODGE, ZION NATIONAL PARK

paving of Reserve Avenue adjacent to the park was completed, thus eliminating a dust nuisance, and the water and electric lines repaired where necessary.

All lawns were placed in good condition and winter grass successfully planted. The slopes on Hot Springs Mountain were landscaped according to plans worked out by the landscape architectural division.

The bathhouses received the customary regular careful inspections. Bacteriological examination of water supplied for bathing purposes was made, and at no time was contamination noted. Bathhouse employees coming in personal contact with persons taking the baths were given physical examinations prior to entrance on duty and subsequently on the first of each month.

Weeds liable to cause respiratory diseases or to favor mosquito propagation were cleared from the park, and all pools of standing water carefully drained or treated with oil.

Park authorities assisted the city of Hot Springs in physical examinations, typhoid and smallpox vaccinations, and Wassermann tests of all persons handling foodstuffs in the city. Cooperation was also given in the examination of various specimens submitted to the laboratory and on matters of rural sanitation.

LASSEN VOLCANIC NATIONAL PARK

One of the major events of Lassen's history transpired during the year 1931 when the park and the new Lassen Peak Loop Highway were formally dedicated by the Secretary of the Interior. Governor James Rolph, jr., of California, also participated in the dedication ceremonies, which were held at Kings Creek Meadows July 24, 25, and 26.

A memorial gateway to the late Judge John E. Raker was erected at the southwest entrance to the park by park forces with funds provided by the California State Chamber of Commerce. The memorial was dedicated by the Hon. Harry L. Englebright, Judge Raker's successor in Congress.

An enormous increase in travel was recorded during the year. The dedication ceremonies, the early disappearance of snow, and the opening of the new Loop Highway were contributing factors. Park visitors totaled 56,833 this year as compared with 31,755 in 1930, an increase of 79 per cent.

The major item of construction was the completion of the surfacing of the new Loop Highway and the oil processing of this unit for its entire length of 29.77 miles. The completion of the Lassen Peak Trail was the major item of the trail program for the season. At headquarters sewer and water systems were installed and a checking station, employee's cottage, equipment shed, and horse barn were erected.

A tract of 280 acres, including Manzanita and Reflection Lakes, was purchased during the year. One-half of the appraised valuation of the land was donated by the Pacific Gas & Electric Co.

The continued planting of fish in the park waters has resulted in this area becoming a fisherman's paradise. Deer are becoming increasingly plentiful, and large numbers of bears and other animals are seen.

With the appointment of an assistant park naturalist the first step forward in an educational program for Lassen was made. Although the museum, presented by B. F. Loomis, of Anderson, Calif., in 1929, has been under park supervision for approximately two years, no material development had taken place. The park naturalist, therefore, had a virgin field in which to work.

The number of rangers proved insufficient to handle the crowds which visited the park this season, and during the dedication ceremonies rangers were detailed from Yosemite and Crater Lake National Parks to assist the protection force.

MESA VERDE NATIONAL PARK

Jesse L. Nusbaum, superintendent of Mesa Verde National Park and archeologist for the Department of the Interior, resigned on March 16, 1931, to accept permanent appointment as director of the new Laboratory of Anthropology at Santa Fe, N. Mex., established for the specific purpose of collecting and studying all data pertaining to the American Indian. The Department of the Interior is fortunate in that it was able to retain Mr. Nusbaum's services as consulting archeologist.

C. Marshall Finnan, acting superintendent of the park for a year and previous to that chief ranger, was appointed to the superintendency upon Mr. Nusbaum's resignation. During his year as acting superintendent, Mr. Finnan proved himself splendidly equipped for the work.

Public interest in southwestern archeology has grown rapidly during the past decade. Mesa Verde, as a significant contributor to the story of prehistoric man in the Southwest, has received constantly increasing attention, resulting in 18,003 visitors to the park last year, the greatest travel it has yet experienced.

THE LABORATORY OF ANTHROPOLOGY

Santa Fe's Laboratory of Anthropology is the direct result of this public interest in prehistoric man and his homes and mode of life. On September 1 this new institution was formally opened, in the presence of a number of the ranking archeologists and anthropologists of the Nation. The one building now completed is but the first unit of the vast laboratory which it is believed will develop as time goes on. It faithfully carries out in every detail the Spanish mission style. Already fascinating prehistoric Indian exhibits are on display.

CONGRESSIONAL AID TO THE PARK

Through the interest of Congress in the Mesa Verde National Park, two important administrative moves were made. One of these granted to the President authority to add to the park a strip of land including an approach highway 1 mile in length and right of way on each side sufficient to protect the scenic beauty of the approach. This short road, built and improved at county expense, connects the park with the main approach highway. The other prohibited the issuance of any permits hereafter allowing prospecting, mining, or other utilization of the mineral resources of the park.

DRILLING FOR WATER SUPPLY

Climatic conditions were ideal for all construction purposes. Throughout the winter the deep test water well was drilled, with a minimum of inconvenience and delay through storms. The depth to which the well will have to go to produce water makes the project unique and without precedent in the National Park Service. So far two water-bearing sands were penetrated. The first, in the upper formation at a depth of 800 feet, produced a flow of 13,500 gallons a day. The second, in the Dakota formation at a depth of approximately 3,000 feet, produced an almost negligible amount. Since the combined output of these two flows would not be sufficient to meet present water requirements of the park, it is necessary to carry the well deeper to the main water-bearing sands known as the Navajo formation. It is urgently hoped that sufficient funds to continue drilling may be provided. Unless more water can be made available in the park, it will be impracticable to carry out plans for the erection of a modern hotel or lodge with private baths and similar facilities.

ROAD AND TRAIL DEVELOPMENTS

The improvement of the year that has drawn the most favorable comment from park visitors is the newly-completed short scenic road leading from the main entrance highway to the highest point in the park known as Park Point. From the terminus of the road a panorama of unsurpassed grandeur is revealed, extending into the four States of Utah, New Mexico, Arizona, and Colorado.

Work on the entrance road itself was completed to the point of surfacing. Graveling is now in progress and will be finished about November 1. It has been found, however, that in Mesa Verde National Park, with its long months of drought and severe windstorms, usually followed by periods of excessive precipitation, the roads must be well treated. For this reason the gravel used this year was a course of large, crushed material intended only for a base, and this foundation will be treated with oil next year.

Of especial interest to visitors was the reconstruction of trails leading to several of the ruins. Spring House, perhaps the most visited of any of the ruins not in the vicinity of park headquarters, formerly was reached by an old trail with grades as steep as 47 per cent and of insufficient width for horses to pass. This was rebuilt to a 4-foot width during the past year, and all grades reduced to a maximum of 15 per cent. The foot trail to Balcony House, one of the most important of the ruins, was greatly improved. Reconstruction of the road between this ruin and Cliff Palace was also undertaken, and several other stretches of old roads leading to important ruins were under reconstruction.

NAVAJO LABOR

Both the National Park Service and the Navajo Indians of the vicinity have benefited from the plan adopted 10 years ago of employing Navajo Indians for common labor. As a result of using Indian labor this past summer, and the foresight of the Indians in saving carefully, about 60 Navajo families are now assured of

sufficient funds to carry them through the winter. Special attention was paid last season to encouraging and assisting the Indians in learning one of the skilled trades. Several hundred cubic yards of masonry head walls and retaining walls on new roads were built entirely by Navajo skilled labor, and they showed a fine understanding of this work. The finished product compares favorably with similar construction along the main highway by skilled white masons.

REPAIR OF SUN TEMPLE

The outstanding archeological accomplishment was at Sun Temple, the great prehistoric ruin on the surface of the mesa. In addition to recapping the walls of the entire structure, concave drainage to protect the walls was installed. Maintenance and minor repair of some of the other ruins also was accomplished.

MOUNT McKINLEY NATIONAL PARK

In July, I had the good fortune to accompany the congressional party to Alaska and Mount McKinley National Park. This was my first visit to the far North, and despite extensive advance reading I was totally unprepared for the vast areas of beautiful and intensely interesting country to be found there.

Alaska offers a number of intriguing trips, but no tour of the Territory would be complete without a journey one way over the Alaska Railway and into McKinley National Park, the second largest in our system.

MOUNTAIN SHEEP AND OTHER WILD LIFE

In addition to towering Mount McKinley, the highest mountain on the North American Continent, the park contains a magnificent display of wild life under perfectly natural conditions—the finest that I know of any place. The White (Dall) mountain sheep, moose, grizzly and black bear, and caribou are the large mammals easily seen by all visitors. The protection afforded the wild life in recent years, of course, is responsible for the increase in the moose and bear, and for the maintenance of the fine herds of sheep. There are some predatory animals such as wolves and foxes, but the National Park Service men are watching this situation carefully, and control measures will be taken as necessary to protect the sheep and other fine animals.

I reread Charles Sheldon's book, "The Wilderness of Denali," and immediately thereafter took trips by air which enabled me to determine approximately the situation of the sheep. I am of the opinion that the sheep population of the park is probably as large as it was in 1906 to 1908, when Mr. Sheldon was there making his careful observations. From every standpoint, I thought the present condition of the wild life excellent. There can be no doubt about the advisability of extending the boundaries of the park somewhat in order to afford better protection to moose, especially in the Wonder Lake region and along the boundary in those sections of the park bordering the headwaters of the Kantishna and the Kuskokwim.

It is desirable also to make an extension of the park in this section in order to make the Wonder Lake available to park visitors and to justify the extension of the auto trail to that region. It is likely that ultimately tourist facilities may be necessary on Wonder Lake.

NEW ROADS AND BRIDGES

The road work in the park is progressing satisfactorily under the Alaska Road Commission. The new Polychrome Pass section was opened late in August, and is one of the great sections of national-park highway. Built to all modern standards, except in width, this stretch of road affords a spectacular outlook over Polychrome Pass, the Alaska Range, and the branches of the Toklat River. A very attractive log bridge over the East Fork, designed by our landscape architectural division, is a notable addition to the structures of the park. The new road is opened up to the Stony Creek region and with a new bridge over the main Toklat just authorized, it will be possible next year for visitors to reach a point over 60 miles west of the railroad.

SERVICE TO THE PUBLIC

Good service was rendered by the Mount McKinley Tourist & Transportation Co. Its accommodations are of the pioneer type but are comfortable and every visitor seems to thoroughly enjoy them. During my visit to the park, I gave such study as I could, in my limited time, to sites for a new lodge to be built near the base of Mount McKinley. There are several sites available, all having good water and excellent views of the great mountain. It will be two or three years before a new site can be occupied.

Air service by Alaskan Airways (Inc.) was continued this year. This park is peculiarly adapted to air service. Its river bars afford fine, safe, landing fields, and the Alaska Range, Mount McKinley itself, and the many branch ranges in the park, all replete with glaciers and snow fields, give the airplane traveler panoramas of Alpine grandeur which can not be surpassed. Two airplane trips over the park convince me that the Alaskan Airways service is quite as important to that region as any facility we have.

OVER MOUNT MCKINLEY BY AIRPLANE

It is important to note here that on August 29, 1931, Pilots Joe Crossen and Ed Young, of Alaskan Airways, each with a sound motion-picture operator, flew over Mount McKinley's summit. Traveling at an altitude nearly 21,000 feet over America's wildest and most inaccessible terrain, these intrepid men in two airplanes have made it possible for us in Washington in early October to see pictures of a peak that was extremely difficult for the few climbers who have attempted to scale its ice-clad sides.

PARK HEADQUARTERS

Our headquarters deserve mention because here are two very interesting features which all visitors enjoy. Our thirty-odd sledge dogs, their kennels, and kitchen plant for preparing their food, give a new note in park management. So much for one of the features.

The other is our new log houses in the headquarters area. They are not only of very interesting design but are built with the utmost care by the superintendent and his men, who are experts in the use of coping and other log-working tools.

If more than allotted space has been occupied by this enthusiastic statement regarding Alaska and Mount McKinley Park, perhaps two facts may be offered by way of justification. First, previous reports have not given adequate attention to our farthest north park and, second, I am especially fond of a wilderness country and pioneer people and back of the Alaska Range, in the park, and in the Yukon Valley I found the combination I have always liked and I hope the time is not far distant when I can go back again.

MOUNT RAINIER NATIONAL PARK

Sunrise, a beautiful scenic area in the White River District of Mount Rainier National Park, was formally opened to the public on July 15. The popularity of this area was apparent almost immediately and all daily, weekly, and monthly travel records for the park were broken. The new White River Highway to the Sunrise area brings out the best scenic features of the district through which it passes. The bridge work and masonry guard rails along the highway are made of natural rock, harmonizing perfectly with the landscape. At Sunrise Point, and at several other advantageous places, observation parking space has been provided to enable visitors to enjoy magnificent views of Mount Rainier and other mighty peaks.

Accommodations in the new area consist of European-plan lodge facilities and 200 modern housekeeping cabins located in a beautiful site which overlooks White River and Emmons Glacier.

Altogether, 293,562 people visited Mount Rainier this year as compared with 265,620 for the last year, or an increase of 27,942.

AREA OF PARK INCREASED

An area of approximately 34,000 acres was added to the south and east portions of Mount Rainier. In addition to enriching the natural scenic features of the park and greatly increasing its educational features, this boundary change simplifies administration, protection, and development of the park by affording a natural boundary on the east, based on topographic conditions. Chinook Pass, thus made the new east gateway, is an unusually spectacular entrance.

ROADS AND TRAILS

Chief among road construction projects were the added units of the West Side Highway and the beginning of work on the East Side Highway.

During the study and planning of park roads, it has been the policy to provide parking spaces at or near some of the outstanding scenic points to encourage motorists to stop and view the scenery along the highway. The first of these park views, Ricksecker Point, is located on the Nisqually Road leading to Paradise Valley. Tahoma Vista, on the first leg of the West Side Highway and Sunrise Point, at the end of Sunrise Ridge where the White River Road turns

upon itself to head toward "The Mountain," are two other such points. Each of these outlooks, developed at some little extra expense, is built with stone guard walls to protect the motorists. A pause on any day at any one of these scenic spots during the travel season will convince the observer of the tremendous popularity of such facilities for viewing the natural wonders of the park.

Counts made on busy days indicate that fully 80 per cent of incoming vehicles stop at such places from a few minutes to an hour or more. Such popularity more than justifies the continuance of the policy of developing prominent outlook points along all park highways. An interesting fact in this connection is that every visitor, regardless of physical condition or time at his disposal, is provided with at least one opportunity to enjoy the scenery of the park to the fullest extent possible.

The Skyline Trail now avoids the ice altogether and the climb to Camp Muir is largely made over barren rock because of the rapid melting of the winter's snow. New ice caves were opened up in Paradise Glacier, the old ones having been destroyed by melting. There were no decided changes in ice conditions at the summit. The most popular route for summit climbers was, as usual, the one from Paradise.

HIGH FIRE HAZARD

Although acute fire hazard conditions existed throughout the 1931 summer season no fires have occurred in the park. The three park lookout stations have reported 26 fires, all outside the park boundary. Following the windstorm of April 22-23 the humidity dropped to eight and remained dangerously low for several weeks. Heavy rainfall during June greatly relieved the danger of fire and its effect was noticeable during the rest of the summer.

A fire one-half mile from the park boundary in a blowdown area was reported, and when placed under control, largely through the use of Park Service men and equipment, covered 20 acres. It is claimed that the fire, which for a time threatened park forests, was started from a snag which held fire during last year's Sunset Park fire. The fire escaped from right-of-way clearing operations.

FISH CULTURE ACTIVITIES

Negotiations for a fish hatchery in the park were entered into with the United States Bureau of Fisheries, but no definite site for a hatchery was selected.

Fish spawned only in the larger lakes, which were closed to fishing during the spawning season. While fishing is not yet as good as it can be with further development, many fine catches were made during the season just past.

EDUCATIONAL DEPARTMENT

The fiscal year 1930-31 was marked by continued progress of the educational department. The greatest improvement was the appropriation of sufficient funds to permit the remodeling of the museum at Longmire. Many exhibits and other museum materials were loaned to the museum by the State Museum at the University of Washington.

GLACIER RECESSION

Glacier recession reached the highest point in history during the past year, the Nisqually receding 118 feet and wasting greatly at the top. Great recession and similar wastage was also noticed in the other glaciers.

PUBLIC UTILITIES

While business has fallen off because of the general business depression, the Rainier National Park Co. has gone ahead with its development program. A complete new lodge containing 40 rooms, cafeteria, supply store, and other services, and 275 one, two and three room housekeeping cabins were constructed at Paradise Valley during the fall of 1930 and placed in operation June 20, 1931. Paradise Inn was redecorated and refurnished, adding greatly to the attractiveness of the building and the comfort of guests. The new Paradise Lodge and housekeeping cabins replaced the old tent camp and proved instantly popular with visitors. The 200 housekeeping cabins and kitchen and cafeteria wing of the new lodge at Sunrise, which were started last fall and opened to the public July 15, also attracted favorable comment.

Another improvement inaugurated during the year was in the transportation service. A contract entered into with the North Coast Transportation Co., a company operating extensive bus lines throughout the Pacific Coast States, provides that the North Coast Co. will haul all passengers from Seattle, Tacoma, and Portland to Longmire in their 32-passenger, inclosed-type busses. At Longmire the visitors transfer to the park-type open stages carrying 14 passengers. This arrangement provides comfortable, inclosed-bus service over the less scenic State highways but a better opportunity to enjoy the forest and mountain scenery along the park roads.

Patronage of the winter-sports facilities at Longmire showed a slight increase last winter, although snow and climatic conditions were below normal. Increased interest in winter sports and a lack of snow at Longmire caused more people to use the winter trail to Paradise Valley than ever before.

PLATT NATIONAL PARK

While the general economic depression throughout the country has not decreased the number of visitors to the park, the stay of the average visitor was very short in comparison with former years. There were 325,000 visitors in 1931 as compared to 178,188 visitors during the 1930 travel year, but much of this travel, which is estimated, originated in the locality. The number of campers in the park increased from 64,057 in 1930 to 68,140 in 1931.

The most important improvement during the year was the installation, at a place remote from the town and the park, of a 4-hopper Inhoff sewage disposal plant and sprinkler filter. The cost was \$45,000 and was borne jointly by the State of Oklahoma, the city of Sulphur, and the park service.

The springs have been inspected regularly for surface seepage and the containers sterilized. Specimens of the waters from the principal springs have been submitted to the Oklahoma Public Health



SNOWPLOW KEPT CRATER LAKE PARK ROADS OPEN FOR FIRST TIME IN WINTER, GREATLY FACILITATING CONSTRUCTION WORK



DRAGGING TO ELIMINATE ROUGH SPOTS ON THE WAWONA ROAD, YOSEMITE NATIONAL PARK



TRACTOR BRINGING SUPPLIES NEEDED IN DRILLING DEEP TEST WELL, MESA VERDE NATIONAL PARK



MUCK TRAIN AT THE EAST PORTAL OF THE WAWONA TUNNEL, YOSEMITE NATIONAL PARK

Service for bacteriological analysis and in no instance has an unfavorable report been received. Few instances of insanitary camps have been reported. This is remarkable when it is remembered that the park is located on two State highways, is in the vicinity of the largest oil fields in the world, and receives large numbers of nomadic visitors.

ROCKY MOUNTAIN NATIONAL PARK

For the past two seasons Rocky Mountain National Park has called me first as I have gone West on my annual inspection tour. This time it also called the Secretary of the Interior.

Its problems were not pressing. Its organization has been functioning smoothly. Steady progress has been made in all lines of activity. It comes first on an itinerary because it is so easily accessible from the East and Middle West by train or by automobile. So we Washington officers find ourselves reaching Rocky Mountain early in the season and after a trip of only about 48 hours by rail from the Atlantic seaboard.

It is quite startling to pause at the Rocky Mountain Park entrance after a delightful ride from Denver in the afternoon and recall that it has been only two days since our train left the Union Station at Washington.

It is easy to imagine the feelings of a Middle Westerner who for the first time arrives in the park region fanned by the cool breezes from the Great Divide, and suddenly remembers that it was only yesterday that he left Chicago, or only last night that he boarded his train at Omaha or Kansas City.

Travel at Rocky Mountain Park this year increased 3.18 per cent over last year. Of the bigger parks in the intermountain region, this showing of increased travel was the best by a considerable margin. There was a decrease in train travel, but motorists came in great numbers and remained rather longer than usual. Our public camp grounds were better patronized than ever, but hotel and pay camp patronage was probably better than was expected.

There can be no doubt about Rocky Mountain Park's future as a vacation land. Its proximity to the Great Plains States and, for that matter, to the center of population, its magnificent scenery, its invigorating air, its wide variety of accommodations, all combine to make it a most attractive region in which to spend one's entire summer holiday.

TRAIL SYSTEM BEING EXTENDED

The favorite vacation sport in Rocky Mountain Park is horseback riding, and it is the present program of the National Park Service to extend the trail system as rapidly as possible. New trails are being built back to lakes and glaciers and high places in the mountains, and in the valleys the trail systems are being tied together so that horses may always be kept from the highways. There are probably 1,500 head of horses being used in Rocky Mountain Park and in the Estes Park section.

A letter signed by the principal saddle-horse operators recently came to the superintendent expressing appreciation of the trail work

already accomplished, and this letter undoubtedly reflects the pleasure and satisfaction of the thousands of saddle-horse users who traversed the new bridle paths.

There are 200 miles of trails in the park. New trails built this year include 1.7 miles up Glacier Creek to the Storm Pass Trail, 5.9 miles of the Fall River Trail connecting with 1 mile built by the Estes Park Chamber of Commerce, Nymph Lake Trail extension one-half mile to Dream Lake, and a beginning of the trail between Bear Lake and the Pool via Fern and Odessa Lakes. The Gem Lake Trail was reconstructed in part, and likewise part of the Twin Sisters Trail was reconstructed. On the west side of the park 1.8 miles of trail were built between North Inlet Trail and Lake Nakoni. This is part of the North and East Inlet loop. Also, a mile of new trail built this year nearly connected Lone Pine Lake and Lake Verna. Trail work is being concentrated in the Estes Park, Grand Lake, and Bear Lake regions, from which the bulk of the travel originates.

PROGRESS IN ROAD-BUILDING

The new Trail Ridge Road over the Continental Divide is taking shape rapidly. The east-side section, 17.2 miles in length, between the Highdrive and Fall River Pass, is practically completed and will be put in service next summer, at the same time being surfaced with crushed rock and oiled. This is the section of the new trans-mountain road that makes this highway one of the greatest roads of the world. It climbs to a height of over 12,200 feet and along Trail Ridge on the very summit of the Rockies takes its course for a distance of 12 miles at an altitude in excess of 12,000 feet. The panoramas of peaks, forests, and glacier-carved canyons to be observed from Trail Ridge are unbelievably spectacular.

The west-side section of this highway, 10 miles in length, destined to be known the world over, is also under construction and will be finished a year hence. Its western terminus is at the Colorado River. The present Fall River Road will be maintained for down traffic only from Fall River Pass to Estes Park, affording an interesting loop trip of value to vacationists sojourning on the east side of the park.

LANDSCAPING ACTIVITIES

Much effective landscaping and roadside clean-up was accomplished during the year, particularly on the Bear Lake Road, our best improved highway at the present time.

As a landscape protection to the new Trail Ridge Road, the Horse-shoe Inn property was purchased, and will probably be cleared of its buildings and fences before next season. Further land purchases were made along the new highway, and others necessary to protect landscape and afford winter range for wild life are in contemplation.

THE WILD LIFE

The wild life in the park has been thriving, except that the mountain sheep do not appear to be increasing, and at times do not look as healthy as we would like to see them. The elk need more winter range. This fine elk herd faced decimation, if not annihilation, this

fall when Larimer County declared an open season on elk for several days in November. On request of the park officials, supported loyally by the Estes Park people, the county authorities rescinded their earlier action.

NEW INFORMATION OFFICE AND MUSEUM

Our new information office and museum, described elsewhere in the report, is nearing completion as this is written. It is a splendid addition to our facilities in the park.

A GREAT TOURIST RESORT

With its new trails leading to all the high places and the lovely hidden valleys of the Rockies, with its new road unsurpassed in grandeur of its far-flung vistas, with its wild life so attractive to park visitors, with its extraordinary facilities for accommodating travelers for a night or for a season, with its friendly Estes Park and Grand Lake citizens supporting the National Park Service, Rocky Mountain Park, it seems to us, is just attaining its destiny as one of the greatest of all tourist resorts.

SEQUOIA NATIONAL PARK

Trail construction is one of the most interesting as well as one of the most important activities in Sequoia. Not only do many visitors reaching the park by automobile and horse take to the trails after their arrival, but our records show that about 4 per cent of them actually enter the park by trail. Work was continued on the High Sierra Trail, which now covers a distance of 17 miles from its beginning at Crescent Meadow. That part of the trail approaching the Hamilton Lake area was heavy construction, and for that reason the mileage covered was not as great as when the work was in less difficult country. Another interesting trail, especially from an administrative and fire-prevention point of view, was that from Paradise Creek to Atwell. It crosses an area of extreme fire hazard and enables quick access to fires in regions which could be reached formerly only after a journey of several hours or a day.

Work was also extended on the John Muir Trail through the park to Forester Pass, where connection was made with trail construction carried on by the Forest Service. A small amount of work will be necessary in 1932 to conclude this project. The John Muir Trail, when completed, will connect Sequoia and Yosemite National Parks, passing through spectacular mountain country.

Popular Moro Rock was made more accessible to visitors by the reconstruction of the Moro Rock stairway. About 75 per cent of this work was completed during the 1931 season.

Notable progress also has been made on road construction, a new contract being let for grading an additional 2.7 miles of the Generals Highway connecting Sequoia and General Grant National Parks to Halstead Meadow. Three bridges at Lodgepole, Clover, and Silliman Creeks were constructed under contract. Under the approach-road authority, grading of 6.7 miles of the Generals Highway starting from the north boundary of Sequoia National Park, running northwesterly to General Grant Park, were placed under contract

this year, as well as 2.38 miles of the Generals Highway within General Grant National Park. The completion of the Generals Highway will afford an interpark trip through unsurpassed mountain scenery. Continued improvements under Park Service force account supervision have been accomplished on the Moro Rock-Soldier Loop Road, subsidiary camp roads, and the old Colony Mill Road. Oiling of the Generals Highway from Ash Mountain to Lodgepole, and of footpaths in Giant Forest has done much to eliminate the dust nuisance. Of interest was the general study of conditions and possible locations for that portion of the High Sierra Highway extending in a general southeasterly direction from Giant Forest to the boundary line and thence to Isabella.

YEAR-ROUND TRAVEL INCREASES

Again the park made a new travel record, with 143,573 visitors. The Fourth of July, the heaviest travel day in its history, saw 4,938 visitors and 1,382 automobiles in the park. Winter travel showed a corresponding increase, and it was not uncommon for several hundred people to enter the park in one day during the off-season months.

EDUCATIONAL ACTIVITIES

The year has been one of real development in educational work. Two temporary ranger naturalists were employed for the first time. The development, however, does not indicate an increase over past years in educational activity, as formerly a woman museum attendant was supported through private subscription and a ranger was loaned as an aid to the park naturalist. It does indicate, however, that this division is no longer entirely dependent upon other help for the success of its work. Because of limited personnel, educational work is confined almost entirely to the Giant Forest area. Naturalist service should by all means be made available at Lodgepole and other areas. Through the interest of Ira Clayton, an "old timer" who lived with Hale Tharp, a feature of historical significance was improved by the restoration of Tharp Log, where the first white man to enter Giant Forest made his home in a fallen hollow sequoia tree.

The museum at Giant Forest unfortunately has long since reached the limit of its capacity and its unsafe construction discourages the addition of exhibits.

FOREST AND MEADOW PROTECTION

In order that the latest methods and practices in forestry might be put into effect, the acting park forester visited the forest insect laboratory, the nursery of the California Forest Experiment Station, and several city nurseries during the year.

Control work was also conducted on the false hellebore which was rapidly taking possession of the Giant Forest meadows and giving them a very unsightly appearance.

The Ash Mountain Nursery supplied planting stock for reforesting trampled areas in the Giant Forest, planting in the administrative area, and furnishing sequoia seedlings to selected institutions and organizations. The seeds of many native plants were gathered to increase the variety of planting stock.

A forest-insect exhibit was prepared for illustrating to the Appropriations Committee, on the occasion of its visit, the seriousness of the insect conditions and the necessity for control.

A complete survey was made of forest-insect conditions in the western part of the park. As a result of conditions observed, bark-beetle control work was inaugurated in three areas. This important protection measure will be extended each year as funds become available, for the beauty of Sequoia Park especially depends upon the preservation of its forests.

WIND CAVE NATIONAL PARK

The most important event of the 1931 season at Wind Cave was the installation of an electric system providing adequate service circuits and a most satisfactory electric lighting of the cave trails and the important and interesting formations. The lights were first flashed inside the cave on July 1, and their continued use since that time has made possible a greater appreciation of the beauties and wonders of the cave by the visitors as well as assisting materially in the administration of the park and the protection of the formations.

While the 1931 season shows a decrease in travel, the year has been marked by real progress in the development of the park. Both park headquarters and the cave are situated on a heavily traveled highway, making impracticable the maintenance of entrance gateways and an accurate count of automobiles and persons entering the park. However, 18,716 persons actually made the cave trip this year, while 23,639 made it last year. This decrease, which is attributed to general economic conditions, is said to be less proportionately than the decrease in travel reported by other tourist centers in the Black Hills.

On March 15, 1931, Supt. Anton J. Snyder was transferred to Carlsbad Caverns National Park, and Edward D. Freeland was transferred from Carlsbad to Wind Cave National Park as superintendent.

An act of Congress approved March 4, 1931, extended the park boundaries on the north, to take in the beautiful wooded Beaver Creek Canyon and a half section of partially timbered land on the northwest corner of the park.

On June 16, Robert and Fanny McAdams, owners of land adjacent to the park, signed an agreement to sell to the Government two fine springs of water and 101 acres of land to protect the springs and to provide a right of way for the pipe line. The National Park Service is indebted to the United States Senator Peter Norbeck and to Superintendent Robertson of the Custer State Park for their interest and cooperation in the negotiations for this purchase.

The past winter was the mildest recorded in many years. The coldest temperature, lasting only three days, was 6° below zero. The past summer, likewise, has been unusual in that the heat has been extreme with high humidity and very little rainfall.

Construction projects completed during the year included, in addition to the electric system heretofore mentioned, a complete water and sewer system.

H. H. Hoyt, gamekeeper for the United States Biological Survey, reports a good increase in the buffalo herd this year; also a moderate increase in the elk and antelope herds.

The public-utility operator, Mr. C. C. Gideon, opened for business on June 1, operating a lunch counter, soda fountain, and service station. Meals were served at all hours and at reasonable rates. The service rendered by Mr. Gideon's organization is courteous and a credit to the park.

YELLOWSTONE NATIONAL PARK

The annual reports of the National Park Service have often begun the story of the Yellowstone season by pointing out that every year in that park brings some outstanding event, that no season is or can be routine and commonplace for the reason that Nature, which there manifests itself in such varied forms, can be depended upon to startle park officials and visitors with one or more surprises.

The season just closed was no exception. While travel was slightly less than that reported for 1930, the decrease being in visitors coming by rail, while the weather was warm and there was practically no precipitation, while fires in distant sections of the park during part of the summer threw a pall of smoke over the entire area, Nature, as usual, wrought interesting changes in thermal basins and arranged for an exhibit of wild life which was rather better than is usually seen.

The most spectacular event in the geyser basins was the eruption of the Splendid Geyser, which erupted on July 28 for the first time since 1892. The height of the eruption was from 100 to 150 feet and lasted for five minutes. This very unusual eruption of the geyser best known to people who are now grandparents had very interesting influences on the Daisy Geyser and several near-by pools of hot water. In the Norris Geyser Basin there was increased power in the eruptions of the Ledge Geyser. In the Old Faithful region, in addition to the display by the Splendid, the Whistle Geyser, long inactive, very effectively demonstrated that it was still alive.

THE WILD ANIMALS

The condition of the wild life in the park has been discussed in another section of this report. As a matter of fact, many of the most important activities of the Yellowstone are of such general interest taken in connection with the activities of the National Park Service as a whole that they have been discussed in sections broadly descriptive of the park system. It may be said here, however, that the fine weather and long dry summer provided ideal conditions for wild life growth and protection, but there is a dark side to the picture which we face as winter approaches. The lack of precipitation made it impossible to harvest the usual crop of hay, and there will be a shortage of winter forage, particularly for buffalo, if we are unable to dispose of a large part of the surplus animals of the herd.

Some years ago it was decided that the buffalo herd should be maintained at approximately 1,000 head and acting under authority granted by Congress we have been disposing of a large part of the surplus each year, either by gift of animals to zoological parks and private estates for exhibition purposes, or by sale to enterprises dealing in buffalo meat and hides. This year nearly 250 calves appeared in the herd bringing its total number to more than 1,300.

Up to this writing it has been impossible to arrange to dispose of the surplus through any of the various courses heretofore open to us.

In connection with the discussion of the Yellowstone buffalo herd, mention should be made of the fact that Burton C. Lacombe, chief buffalo keeper for many years, reached the retirement age, but it was possible to retain him in active service by assigning him as custodian of the Craters of the Moon National Monument in Idaho.

The bears in the park are apparently increasing. It is difficult to place an estimate on the number of grizzly and black bears that inhabit this great reservation. While many of these interesting animals are seen along the road there is no reason to believe that they are likely to increase beyond reasonable numbers. This is particularly true in the case of the grizzly bear which in the United States, exclusive of Alaska, really is a rather rare species. The black bears have become troublesome at times, but it has always been the practice of the National Park Service to dispose of members of the black bear family when they show signs of making unprovoked attacks on park visitors or their property. This subject is discussed elsewhere in the report. A fine new bear feeding field was opened to the public on Otter Creek just south of Canyon Junction. Great gatherings of visitors are to be found each night at the various feeding grounds in the park, particularly at Old Faithful where under the auspices of the educational division a very interesting talk is given by a ranger naturalist.

MANY STREAMS RESTOCKED

There has been the closest cooperation between the Bureau of Fisheries and the National Park Service in the restocking of park waters. At the lake hatchery 17,500,000 eggs were harvested of which 6,000,000 were hatched in the park and distributed to its streams and lakes. Eggs collected in the Yellowstone, of course, are of the native cutthroat trout, but this year for the first time eggs of the grayling were taken at Grebe Lake.

EXCELLENT PROGRESS IN ROAD BUILDING

Fine progress was made in the improvement of roads of the park. The system includes 310 miles within the park boundary. Approximately 60 miles of the east and south approaches to the system were given oil treatment to suppress dust. Clean-up of roadsides was conducted as a maintenance project, over 135 miles being cared for this year. Twenty miles of the West Gallatin road were surfaced with crushed rock, and an armor coat of asphalt-treated material was placed on 10 miles of the road between West Yellowstone and Madison Junction. Many sections of the main highways were reprocessed under the so-called oil-mix method.

New road projects under construction included the surfacing of the new highway between Obsidian Cliff and the Firehole Cascades, 24 miles in length. The 17-mile stretch of the Cody road between the east entrance and Lake Butte was also completed to the same standards. These roads can be said to be completed until such time as heavier paving is needed.

The new road to Artist Point, 1.6 miles, was graded and surfaced with crushed rock. Another fine project completed was the grading of the new road between Grand View Point on the Canyon of the Yellowstone and Tower Falls. This is the section known as the Dunraven Pass road.

New contracts let this year include another section of the Grand Loop from Tower Falls through Camp Roosevelt and on to Black-tail Deer Creek, only about 7 miles from park headquarters; also the section from Mammoth Hot Springs to Obsidian Cliff exclusive of a small section in the Golden Gate.

The road construction policy for Yellowstone Park contemplates the rebuilding on modern standards of the Grand Loop Highway connecting all the main points of interest and of the six approaches to that highway before any new projects are undertaken.

Another policy contemplates keeping as much of Yellowstone Park as possible in primitive condition and we are always glad to emphasize the fact that more than half of this great area is a wilderness unspoiled by roads, in many cases untouched even by man-made trails, the paths of animals having been cut out to provide routes for patrolling rangers.

SANITARY IMPROVEMENTS

In a park as large as this one important sanitation problems are always requiring solution. Great strides have been taken in installation of sewer and water systems in all parts of the park. In fact, all of the points of tourist concentration are protected by sewage disposal facilities except headquarters, and in the current appropriation act funds are included to begin the construction of the Mammoth Hot Springs sewage plant. Altogether there are 16 water systems, 20 sewer systems, and 5 incinerators in the Yellowstone, not counting primitive facilities at minor camp grounds.

THE PUBLIC UTILITY OPERATORS

Mention of the service of the Yellowstone operators has been made elsewhere. Excellent accommodations were provided as usual. The new Canyon Hotel wings mentioned in last year's report were completed and partially furnished during the past summer.

Stores in the national parks are somewhat incidental enterprises, but in Yellowstone there are several chains of photographic, curio, and general supply stores that are unique. The Haynes Picture Shops are the largest retail photographic enterprises that we know of. They are housed in relatively new buildings. The Whittaker and Pryor groups of stores are notable both for size and stocks of goods. The Hamilton chain, however, ranks among the unique features of the park system. The new Hamilton Stores at Old Faithful and Fishing Bridge are tremendous structures built of concrete and steel and equipped with every modern merchandising facility. They are likely to be, for years to come, the largest enterprises of their kind. The courage of the owner and his financial backers commands admiration. There can be no doubt of his faith in the future of Yellowstone Park.



LE-ME, YOSEMITE INDIAN. DEMONSTRATING INDIAN SIGNS AND DANCES
OUTSIDE YOSEMITE NATIONAL PARK MUSEUM



UNIVERSITY OF CALIFORNIA FIELD CLASS IN YOSEMITE NATIONAL PARK



WEATHERPROOF PICTORIAL FINDER AT VALLEY VIEW, YOSEMITE NATIONAL PARK

Visitors orient themselves by noting labeled feature on the picture.



A NATURALIST AT GLACIER POINT EXPLAINING THE GEOLOGIC STORY OF THE YOSEMITE VALLEY

YELLOWSTONE'S FORESTS

The forests of the park have been giving us much concern. There is a very serious insect epidemic in the southwestern part of the park which, if not controlled, may destroy all of the lodgepole forests, and when it is realized that over three-fourths of the area of the Yellowstone is covered with this species of conifer the potentialities of this insect infestation are startling indeed.

The lack of precipitation during last winter and the dry summer made conditions in the forest just right for bad fires and for the first time since 1919 there were serious fires to combat. There were 113 fires in all, which burned a total of 20,605 acres. The largest fire was in the Heart Lake district where 18,756 acres of timber were destroyed by fire caused by lightning which, due to high winds, spread rapidly and widely over the big area. A fire late in September burned approximately 1,000 acres on Chipmunk Creek and another in the Gallatin country swept 400 acres earlier in the month.

NO PARK BOUNDARY CHANGES

There have been no boundary changes in Yellowstone during the past year. In another part of this report there is a discussion of the final recommendations of the Yellowstone Park Boundary Commission which made a study of the extension proposals in 1929.

GENERAL CONDITIONS NEVER BETTER

I have been closely associated with the administration and protection of Yellowstone Park for 16 years and despite the dry season and interruption of normal activities by forest fires and other emergencies, upon an inspection of the park, from September 16 to 21, I was glad to be able to say to the superintendent that I had never seen the roads in better condition or the park in general in better trim than it is at the present time, nor can I recall that it ever had a more enthusiastic and capable group of employees than the permanent organization now in charge of its destinies.

YOSEMITE NATIONAL PARK

In common with all of California, Yosemite suffered seriously from subnormal precipitation. Snowfall was light and recession early. The results were a long summer season, a diminution of water supplies, in some instances to zero, extreme fire hazards in our great forest, and certain effects upon flora and fauna. The discomforts of this extreme dryness to park visitors were mitigated, however, by progress made during the last five years in dust-proofing roads, parking areas, and bridle paths.

For the fifth successive season travel remained stabilized at about 460,000 visitors. Holiday periods brought the usual peak loads. Last May 30 saw the heaviest travel day in park history, 11,986 people entering the park on that date. Though 18,512 people were in the valley on July 4, no sense of overcrowding was experienced. A greatly improved physical layout and a much better understanding of problems by the ranger personnel obviated practically all semblance of congestion.

Yosemite set a new record for winter travel when 1,180 cars with 4,462 people entered the valley in one day last February. Railroad and stage travel is still on the decrease, with private cars showing a gain.

An increase of 11 per cent in the number of campers in Yosemite is accounted for by the improvements in the camps and by the fact that the business depression undoubtedly caused many visitors to bring their own camping equipment. The average stay was close to seven days. The six camp grounds in operation on the valley floor were well filled most of the summer. The total number of campers for 1931 is estimated at 132,000, compared with 117,600 in 1930.

HETCH HETCHY AGREEMENT

In December, 1930, the Hetch Hetchy problem came before the Department and Service for readjustment in the light of conditions that have materially changed since 1913 when the so-called Raker Act was passed giving the city and county of San Francisco rights to store water in the Hetch Hetchy Valley and at Lake Eleanor in Yosemite National Park.

The city had found it necessary to dispose of power generated at its Moccasin Creek plants (outside Yosemite Park) with Hetch Hetchy water, because it had not been able to acquire a distributing system of its own. The power was being delivered to the Pacific Gas & Electric Co. under an agency agreement which had never received the approval of the Department. In August, 1930, the voters of San Francisco refused to approve a bond issue to buy the distributing systems of the power companies now serving the city. This made it necessary for the city to continue its disposition to the Pacific Gas & Electric Co. Meantime, the city had failed to diligently carry out the provisions of the Raker Act in respect to building roads and trails in Yosemite Park, which requirements were a part of the consideration for the Hetch Hetchy grant.

The Secretary of the Interior, on recommendations of the late Director Mather and Superintendent Lewis, had ordered the city to improve and surface the road to the Hetch Hetchy Dam, to build a new road from Canyon Ranch to Harden Lake along the south rim of the Tuolumne Canyon, to build a new road from the dam to Lake Eleanor, and to construct a trail along the north wall of the Hetch Hetchy gorge to Rancheria Mountain thence to Lake Vernon and Tiltil Valley. The total cost of these improvements and new works in 1928 was about \$1,630,000. The city officials opposed the Lake Eleanor road because, they contended, it was unnecessary, and also would bring about interference with their water supply there. Furthermore they felt that the Harden Lake road was too costly as planned by the Bureau of Public Roads and the Park Service. The city's representatives asked for permission to continue the sale of Hetch Hetchy power, and some revision of the road requirements, and promised to expedite construction if their proposals could be met.

After extended conferences, participated in by the Secretary, the Assistant Secretary, the Solicitor, the Director of the Park Service, and several California Members of Congress, a satisfactory arrange-

ment was made whereby the city agreed to build the roads and trails set forth in a new program to cost \$1,500,000, expenditures to be made at the rate of \$250,000 per year for six years. The 1931 program was to complete the road to the dam and surface and parapet it; also to finish the trails as previously required. In 1932, 1933, and 1934 the Harden Lake Road is to be built at a cost of \$750,000. In 1935 and 1936 the road from Crane Flat to Mather Station, through the wonderful forest acquired in 1930 with the aid of Mr. John D. Rockefeller, jr., will be built at a cost of \$500,000. This Crane Flat-Mather Road will be in lieu of the previously required Lake Eleanor Highway.

During the past year San Francisco has fully complied with this new understanding.

MAJOR ROAD CONSTRUCTION

Road construction in this park was concentrated largely on the new Wawona Road, the grading of which, except for the tunnel section through Turtleback Dome, was completed. Through the use of the California oil-mix method a dust-proof surface was laid and the new road made usable by the traveling public all the way to the Mariposa Grove with the exception of the tunnel section. Out of a total length of 4,230 feet, 2,455 feet of the tunnel had been constructed by the end of August, and the project is far ahead of contract requirements.

The construction of this road, particularly the tunnel portion, has received widespread commendation, as it has avoided making a tremendous scar on the south wall of Yosemite Valley.

SANITATION AND WATER SUPPLY

Last year I reported that the outstanding sanitary achievement of the year in the national-park system was the beginning of construction of an adequate sewage-disposal plant in Yosemite National Park. This year I am glad to report the completion and satisfactory testing of this plant. It can treat approximately 1,000,000 gallons of sewage a day, with a slight excess for a few days during the rush season.

The completion of the new water system at the Mariposa Grove was a matter of importance to a large number of park visitors, as it relieves one of the most critical water situations in Yosemite National Park. Under the new system a fine supply of water is brought through a 2.65-mile main from springs on the slope of Mount Raymond, outside the park.

For the first time in the history of the park, equipment was available continuously last summer for the clean-up of mountain roads, and gratifying results were obtained.

It is interesting to note that the incinerator at the garbage-disposal plant made a new record, the cost per can being \$0.006 less than the extremely low cost of \$0.151 per can last year.

I have stressed this part of our work more in Yosemite than in the other national parks, because in Yosemite Valley alone, during the peak season, conditions are comparable to those obtaining in a fair-sized city. At some periods during the height of the season

the overnight population of the valley is 25,000. With this number of people to accommodate, the service believes it can not stress too strongly the importance of modern, adequate sanitary arrangements of all types.

USE OF NATURALIST FACILITIES

The increasing tendency of park visitors to look deeper into the facts of nature was emphasized during the 1931 travel season, when the educational staff served 290,000 visitors. The Yosemite museum continued to serve as the focal point of the educational activities, but the new museum at Mariposa Grove also was the gathering place for many thousands.

A start was made in cataloguing the more than 3,000 books accumulated in the nature library in the Yosemite museum. About 500 volumes were catalogued and indexed by an expert librarian from the Oakland Public Library. Plans contemplate the completion of this work next year.

LANDSCAPING

The encroachment of forests into the El Capitan Meadow and a few other areas was partially corrected by cutting out pine and oak trees under 6 inches in diameter. Many denuded areas on the valley floor, which had needed treatment for years, were restored by plowing, harrowing, fertilizing, and the planting of native grass and flower seeds. Areas from which several houses were removed were treated similarly. A general program along these lines is continuously under way in all areas. Visitors to the park in the future will reap full benefit from this restoration.

SIGNING OF ROADS AND TRAILS

Progress was made in signing the roads and trails according to a comprehensive program for sign installation. In making this broad plan, assistance was rendered by the California State Automobile Association, affiliated with the American Automobile Association. Well-designed, illuminated signs also were made for important buildings such as the administration building, museum, and hospital, and for the camp grounds. It is particularly interesting that the attractive signs used in the latter instances were made in the park shops out of scrap material through the medium of an acetylene torch.

PARK OPERATORS

The Yosemite Park & Curry Co. naturally felt the effects of the world-wide depression and suffered at least equally from the effects of the excessive drought upon California. The winter-sports season fell short of expectations due to light snowfall and mild temperatures, which made even skating impossible at times. Owing to these factors, the company undertook no expansions and no notable improvements.

Due to the rigid curtailment of expansion, operating, and maintenance expenses, I am glad to report that the company is in a strong financial position. It is greatly encouraged by the showing of the past year in the face of so many obstacles.

GIFTS

Many gifts were presented to the park, and especially to the museum, by friends of the park. Outstanding among these were a highly appropriate entrance marker erected at the El Portal boundary with funds donated by Mr. James H. Schwabacher, of San Francisco, in memory of his father-in-law, Samuel Dinkelspiel, who for many years was devoted to the interests of Yosemite.

Miss Marjorie Montgomery Ward, of Chicago, authorized the expenditure of \$4,000 in bringing the area at the rear of the museum into natural beauty and an enlarged usefulness as a living exhibit of native wild flowers, etc. There were numerous other contributions to the park.

ZION NATIONAL PARK

Reference already has been made to the purchase of a square mile of privately owned land at the mouth of Zion Canyon, at the park entrance. This purchase is most important from an administrative and a landscape point of view, as it affords an ideal site for the construction of a needed new camp ground.

Supt. E. T. Scoyen was transferred to Glacier National Park last January 16, and the vacancy thus created was filled by the transfer of Supt. Thomas J. Allen, jr., of Hawaii National Park, to Zion.

The absence of snow and the mild temperatures which prevailed during the winter and early spring resulted in a heavy increase in travel for that period. By the end of March the increase amounted to 50 per cent over the same period a year ago. Since then, however, owing to extreme heat and drought conditions, there has been a steady falling off in travel. Despite this fact, the total travel was 59,186, an increase of 7 per cent over the 1930 travel year.

ROADS

The main road up the floor of the canyon was rebuilt along modern standards from the checking station to the Temple of Sinawava. Work on this project began on April 12 and at the end of September was 75 per cent completed. River protection work was an important feature in connection with the reconstruction of the canyon road. Two additional rock dykes were built in the vicinity of Zion Lodge. The protection which these and previously built dykes afford has enabled construction of the new road past the lodge on a new alignment, allowing it to follow the river to a point near the public camp ground, and thus making available for parking and construction purposes a large area which was formerly a part of the river channel. Masonry walls for a distance of 850 feet provide additional protection from the river. Particular attention was given to landscape requirements on this project. The reconstruction of this road was a project under the emergency employment program of Congress and has helped materially in relieving the unemployment conditions in this part of the State.

The Zion-Mount Carmel Tunnel Highway is the favorite route of motorists entering the park. In the first year of its operation this scenic route has developed into the principal cross-State highway of southern Utah.

INSECT INFESTATION CONTROL

Probably the worst insect infestation in many years occurred this spring when the park was literally overrun with caterpillars. Heretofore their activities were practically confined to the ash tree, but this year they attacked the cottonwoods as well, and since this is the major deciduous tree of the park, it became necessary to resort to control measures on a rather large scale. A liberal treatment of lead-arsenate spray was used and proved very successful, but it is quite apparent that it should be repeated each year to keep these insects in check.

UTILITIES

The grounds in front of Zion Lodge were greatly improved by the removal of the old rock seats and fireplaces and by planting of an attractive lawn. Other changes involving the grounds and parking area will be made as soon as the old road is obliterated this fall.

In spite of a very poor year financially, the Utah Parks Co. rendered excellent service to all its patrons throughout the tourist season, and in no way lowered its standards of caring for guests from those established in previous years.

There was a strong demand for accommodations of the housekeeping type, however, and it is hoped that the operators soon will install such a development on lands recently purchased by the service which are especially suited to this purpose.

*NATIONAL MONUMENTS**COLONIAL*

The sesquicentennial celebration of the surrender of the British forces at Yorktown, Va., on October 19, 1781, has created nationwide interest in the only two national monuments in the East which are under the administration of the National Park Service. These are the Colonial National Monument, which includes historic features of Yorktown, Williamsburg, and Jamestown, and the George Washington Birthplace National Monument at Wakefield.

Since the establishment of the Colonial Monument on December 30, 1930, the Park Service has cooperated in every way possible with the United States Yorktown Sesquicentennial Commission and other agencies in its plans for the Yorktown celebration. An administrative organization, in charge of Engineer O. G. Taylor, was assembled and development work pushed in every way possible. With funds from the \$500,000 congressional appropriation made for the monument in March, 1931, approximately 2,000 acres of land were purchased in the Yorktown Battlefield area and on the road right of way between Yorktown and Williamsburg. The Yorktown Inn, built in 1725, and the Moore House, where the terms of surrender were drawn up, were also purchased. Approximately \$550,000 from emergency relief funds were available for road construction in the spring and the Bureau of Public Roads began surveys and plans immediately. Contracts were awarded for the grading of approximately 9 miles of parkway between Yorktown and Williamsburg.

A deep-well water system providing approximately 100 gallons per minute was constructed. To supplement this supply for the

period of the Yorktown Sesquicentennial Celebration, a pump and motor was installed on another well near the York River. A water-distributing system approximately 3 miles in length and a number of fire hydrants were installed to protect the historic buildings at Yorktown. Six comfort stations with suitable disposal plants were constructed.

William G. Robinson, jr., was appointed superintendent of the monument.

WAKEFIELD

The National Park Service was authorized by Congress in 1930 to cooperate with the Wakefield National Memorial Association in the restoration of the long-neglected birthplace of George Washington at Wakefield, Va. Under the direction of Engineer Taylor, the development program for this monument has gone forward rapidly, and in June of this year the house and kitchen, which represent two of the most interesting features of the rehabilitation program, were completed. A water supply and sanitation system were also installed. Plans for extensive landscape work to complete the picture of a colonial homestead are now being carried out.

A hostess was installed in the house by the Wakefield Association. A count of visitors was made during August for the first time, and showed a total of 4,437.

The acreage of the monument is at the present writing approximately 307 acres, but land sufficient to make the total acreage approximately 400 acres has been deeded to the Government by the association and will be formally added to the monument in the near future.

The family vault at the ancient graveyard has been reconstructed. A wall of brick made by hand on the place will be built around the graveyard in the near future. The Wakefield rehabilitation program, like the Colonial program, has been facilitated in every way possible to aid in the 1932 national celebration on the two-hundredth anniversary of the birth of George Washington.

DEVILS TOWER

Made accessible the year round by a new bridge built a few years ago and now under administration of a full-time custodian, this important monument is becoming a favorite place to tarry awhile as travelers move back and forth across the country. Roads and trails have been improved this year, and a cabin has been constructed for the officer in charge. The camp grounds have been extended, and sanitation control has been brought into line with national park policies. Many commendations of our personnel at the monument and the service extended there to the public have been received.

During the winter a campaign of education will be conducted with a view to attracting more visitors to Devils Tower next summer.

SCOTTS BLUFF

I visited this interesting historical monument in June. It includes a series of bald, striking buttes which rise high above the Platte River and which are covered with native trees, brush, and flowers. The buttes were landmarks in the early days, and the Oregon Trail

took its course through a pass between two of the outstanding mountains.

There is need for a road to the summit of one of these historic buttes, but neither the National Park Service nor the local communities want a road built if the construction of it will cause irreparable injury to the bluffs which give the monument such prominence in the North Platte Valley. Surveys by the Bureau of Public Roads and careful investigations by our landscape architects are now in progress. The pride of Scotts Bluff, Gering, and other Nebraska cities in their beautiful, historic monument, as well as the policies of the National Park Service, are sufficient guaranties of the safety of this important feature of the Old Oregon Trail.

COLORADO MONUMENT

Another area especially considered during the year was the Colorado National Monument near Grand Junction, Colo. Already developed locally as a game preserve and partly accessible by trails constructed with funds privately subscribed, it deserves wider recognition as a worthwhile member of the national-monument system because of its scientific interest and its scenic quality. It should have a few miles of road, and such a highway possibility I was able to study in June, 1931. The road is feasible and should be on our program for construction as soon as it can be adequately planned. This monument will be a feature of our special travel program that will afford travelers a chance to see the Colorado at its head in Rocky Mountain Park, then in going westward observe irrigation from the river at Grand Junction, the Dinosaur exhibits near the Green River tributary, next Bryce Canyon, and Zion and the Grand Canyon Parks, and finally the Hoover Dam at Black Canyon.

BOUNDARIES OF KATMAI EXTENDED

By presidential proclamation 1,609,600 acres were added to Katmai National Monument on April 24, 1931. The total area of the monument is now approximately 2,697,590 acres, and was enlarged to protect the brown bear, moose, and other wild animals of the region, as well as preserve an area of historical and scientific interest.

MUIR WOODS

A good trail maintenance and improvement program was carried on in Muir Woods during the year. A large foot log across Redwood Creek in the upper end of the woods and the brushing out of a new trail on the west side of the creek opened up an undeveloped area. An abandoned trail paralleling the creek on the west side was entirely rebuilt and labeled as a nature trail.

The main monument thoroughfare was connected with the abandoned Muir Woods railroad grade so that fire equipment and work trucks could enter and leave by this route in emergencies.

A free road to Muir Woods is badly needed and the Mill Valley Chamber of Commerce is sponsoring an active program for public ownership of the present toll road.

NATURAL BOUNDARIES FOR PINNACLES

In an effort to achieve natural boundaries for Pinnacles National Monument, the county of San Benito, Calif., has purchased and transferred to the United States approximately 1,926 acres of land. Another tract of 160 acres is being condemned by the county. This, with about 2,000 acres of public domain which has been withdrawn from entry, will round out the natural boundaries of the monument.

Some of the finest scenery of the monument has been made accessible by the construction of a trail more than 2 miles long from the lodge to the easterly high peaks and stairs have been built into heretofore inaccessible caverns.

THE SOUTHWESTERN MONUMENTS

So that Superintendent Pinkley might have more time to devote to the general supervision of the Southwestern Monuments, he was relieved of his duties at Casa Grande National Monument, where his headquarters are located, by the establishment of a custodianship for that monument, effective July 1, 1931.

On April 1, 1931, the President signed a proclamation creating the Canyon de Chelly National Monument, consisting of 83,840 acres located on the Navajo Indian Reservation in northeastern Arizona. The area includes Canyon del Muerto and is of great archeological and scenic interest. There are now 18 monuments included in the southwestern group.

On June 20, 12,792 acres within the boundaries of Petrified Forest, but theretofore privately owned, were formally added to that monument. These lands were acquired through trading for them public lands outside the monument. A 7-acre tract added to the Aztec Ruins National Monument on February 13 provided a badly needed administration and residence site. Fifty per cent of the purchase price was donated by private persons.

CONSTRUCTION

The following are some monument-construction activities now under way: At Aztec Ruins, a custodian's residence, comfort station and sewer system, implement shop; at Casa Grande, an administration building, residences for the superintendent and the custodian, a tool shop; at Gran Quivira, a residence for the custodian; at Petrified Forest, an administration building, custodian's residence, two ranger residences and a tool shop; at Tumacacori, ranger's residence, tool shop, and sewer system. Funds have been allotted for the building of a shelter over the Casa Grande Ruins. A fence will soon be built along two sides of the monument; irrigation canals protect the other two sides.

ROADS

The Bureau of Public Roads has under construction a 16-mile road through the Petrified Forest and a bridge across the Rio Puerco. This is the most important improvement project ever initiated in the Petrified Forest National Monument, as it will insure travelers using U. S. Highway 66 crossing the Rio Puerco at all times of the year.

Up to the present time, at certain periods during the year, high water in the Rio Puerco cuts off the Petrified Forest National Monument from motorists traveling north of the monument. The new road and bridge will also permit westbound train visitors to leave Santa Fe trains at Adamana, motoring through the monument to Winslow and those eastbound to leave Winslow picking up the train at Adamana. Over 8,000 train travelers took advantage of this service but had to make the long automobile trip from Winslow to Petrified Forest and return.

The road leading to the top of Capulin Mountain was put into good shape early in the season. Considerable repairs were also made on the road at Gran Quivira and the trails at Natural Bridges. Important repairs were made on the old fort at Pipe Spring.

WATER SUPPLY

A good water supply has been obtained for Casa Grande by drilling a 6-inch well, 186 feet deep. A well, 75 feet deep, was also drilled at Aztec Ruins. Some improvements were made in the water distribution at Petrified Forest, but water for the headquarters area is still being hauled about 16 miles.

CAMP GROUNDS AND SANITATION

Camp grounds are maintained, usually in the vicinity of headquarters, at many of the monuments. Modern installations have greatly improved the sanitary conditions of the camp grounds, and, as funds permit, we expect to improve sanitary facilities further. The demand for camp-ground accommodations increases steadily.

EDUCATION

Petrified Forest, Aztec Ruins, Casa Grande, Chaco Canyon, Gran Quivira, and Montezuma Castle now have museum collections, at present housed in more or less makeshift structures. The building program for Casa Grande and Petrified Forest will remedy this condition, but the other monuments will have to be provided with museum space in the near future. An interesting collection which has been started at Tumacacori can not be displayed at all on account of lack of space.

Although the educational use of the Southwestern Monuments has always been stressed, the addition of a naturalist to the staff has made possible the expansion of this work. Enlargement of old features is planned as well as the addition of many new ones. At present the custodians furnish guide service, and there is a great need for ranger naturalists. Where space is available artifacts are displayed.

During the year many of the monuments were visited by student classes of archeology and geology from various institutions of learning. The monuments are fine places for practical field study and this type of visitor appears to be increasing in numbers each year.

The Van Bergen-Los Angeles Museum Field Expedition, under the supervision of Irwin Hayden, continued the excavation work started last year at Casa Grande and at adjacent sites. As soon as the administration building is ready to receive it, a part of the in-

interesting representative collection which has been assembled will be given to the monument. The expedition has also presented the monument with a good model of Compound "A" at Casa Grande, representing the village as it appeared at the time of occupation. The American School of Research conducted some excavation work at Chettro Ketl, in the Chaco Canyon.

MONUMENT TRAVEL

A total of 392,011 people visited the national monuments during the 1930-31 travel year. This represents a 17 per cent decrease from the total of 472,095 visitors recorded for the previous year. An extremely hot summer and bad road conditions in the Southwest, where a large number of the national monuments are located, are believed to have contributed equally with economic conditions to this decrease. Had it been possible to obtain an accurate count of the travel to the new Colonial National Monument in Virginia, the 17 per cent decrease would have undoubtedly been greatly reduced if not entirely wiped out.

NECROLOGY

It is my sad duty to report herein the death of several pioneers in national-park work. Col. George W. Stewart, of Visalia, Calif., died in San Francisco on September 7, 1931. Known as "the father of Sequoia National Park," it was largely through his personal efforts that this park was established in 1890, and he was always a staunch friend and defender of the park and of the National Park Service.

Word came from Hawaii of the death of Lorrin A. Thurston on May 11. Not only was Mr. Thurston primarily responsible for the establishment of Hawaii National Park, but he was a leader in Hawaiian affairs for more than half a century, as lawyer, statesman, and publisher. His outstanding achievements were the reformation of the Hawaiian Constitution in 1887, participation in the annexation movement, and, after the establishment of the Territorial form of government, the drafting of laws for bettering conditions.

Horace Kephart, Southern author closely associated with the Great Smoky Mountains National Park project, was killed in an automobile accident early in April.

Mrs. Harry L. Rust, sr., president of the Wakefield National Memorial Association, died June 25, adding one more name to the roster of those who have devoted their lives to the preservation and protection of America's historic and scenic areas. Her enthusiastic and persistent work in behalf of the preservation of Wakefield resulted in the establishment of the George Washington Birthplace National Monument and the rehabilitation of the old homestead and surrounding grounds.

Hamp Williams, appointed by Secretary Wilbur as chairman of the Hot Springs Planning Commission, which considered and advised the Service on Hot Springs National Park developments, died on May 16.

A distinct loss was suffered in the ranks of the national park public utility operators, and by the National Park Service, through the death of Harry W. Child on February 4, 1931, after a long illness. Mr. Child was actively engaged for about 40 years in the development

and management of hotel and transportation utilities in Yellowstone National Park. His keen interest in the utilities under his control did not cease when illness forced him to relinquish active management to others, and he was planning further developments in their operations at the time of his death.

LEGISLATION

The members of the Public Lands and Appropriations Committees of both Houses of Congress were most interested in the legislation submitted by the department on behalf of the National Park Service, and on the floors of the Senate and House our bills in most cases were passed by unanimous consent in view of the strongly favorable committee recommendations.

The following is a summary of legislation affecting the National Park Service pending or considered in the third session of the Seventy-first Congress:

BILLS ENACTED INTO LAW

The act of December 20, 1930, making supplemental appropriations to provide for emergency construction on certain public works during the remainder of the fiscal year ended June 30, 1931, with a view to increasing employment (Public, No. 550) carried appropriations for the National Park Service as follows:

Roads and trails.—For the construction, reconstruction, and improvement of roads and trails, inclusive of necessary bridges in the national parks and national monuments, under the jurisdiction of the Department of the Interior, fiscal year 1931, \$1,500,000.

The first deficiency act of February 6, 1931 (Public, No. 612), carried appropriations for the National Park Service as follows:

Colonial National Monument:

Acquisition of land.....	\$500, 000
For administration, protection, maintenance and improvement and purchase, maintenance, operation, and repair of motor-driven passenger-carrying vehicles.....	58, 900
Construction of physical improvements.....	76, 100

The appropriation for the construction of roads and trails in the national parks and national monuments contained in the act approved December 20, 1930, was made available in so far as was necessary for the construction of highways within the areas authorized as national parks and for continuing construction of an approach road from the National Old Trails Highway to the south boundary of the Grand Canyon National Park.

The Interior Department appropriation act for the fiscal year ending June 30, 1932 (Public, No. 666, approved February 14, 1931), carried appropriations of \$9,498,250 for the National Park Service in Washington and for the administration, protection, maintenance, and improvement of the various parks and monuments, as well as for the construction of roads and trails therein. Included in this sum was \$1,000,000 for the acquisition of privately owned lands in the national parks, to be expended only when matched by equal amounts by donation. This act also carried authority for the entering into of contracts in the amount of \$2,850,000 for roads and trails in the

parks and monuments, in addition to an appropriation of \$5,000,000 for such work to be immediately available.

Other important items of the act are: Authority for attendance of employees of the Service at meetings concerned with their work, and authority for the employment of specialists and experts for examinations and investigations of lands to determine their suitability for national park and national monument purposes. Necessary funds for the examination of proposed park areas were provided. Of the unexpended balance of appropriations made for the acquisition of privately owned lands, \$200,000 was made available for payment in full of the purchase price of any of those lands to be matched by subsequent donations.

The second deficiency act of March 4, 1931 (Public, No. 869), carried the following items for the parks and monuments administered by the National Park Service:

Mount Rainier National Park, for construction and operation of an electric power plant and distributing system at Yakima Park, fiscal years 1931 and 1932-----	\$71,000
Wind Cave National Park, for a water-supply system, including the purchase of lands and/or interests in lands and/or water rights for protection thereof, fiscal years 1931 and 1932-----	50,000
Yosemite National Park, for an additional amount for completion of a sewage-disposal system on the floor of the valley, fiscal year 1931-----	32,500
National monuments: For an additional amount for a water supply at Chaco Canyon National Monument, fiscal year 1931-----	3,000

It also provided for an additional amount for the construction, reconstruction, and improvement of roads and trails in national parks and monuments and of national park and national monument approach roads, inclusive of necessary bridges, \$2,500,000 to remain available until expended.

S. 43, authorized the payment of \$1,800 to George Snyder, the amount of the judgment recovered by him against W. W. Payne for acts committed by Payne while acting as superintendent of the Glacier National Park. (Private Law 448, approved March 4, 1931.)

S. 196, to provide for uniform administration of the national parks, by the United States Department of the Interior, provided authorizations in law, the need for which had been definitely felt, in a proper administration of the national parks and monuments. (Public, No. 574, approved January 26, 1931.)

S. 5248, authorized the addition of 1,200 acres of land to the Wind Cave National Park. (Public, No. 843, approved March 4, 1931.)

S. 5616, authorized the appropriation of \$2,000,000 for all expenses incident to the examination and establishment of the monument and for the acquisition of lands and/or lands and improvements needed for the completion of the monument, including the securing of options and other incidental expenses. The area of the Yorktown battlefield was extended from 2,500 acres to not to exceed 4,500 acres, and all Government-owned lands within the boundaries of the monument as established by presidential proclamation were transferred to the administrative jurisdiction and control of the National Park Service. (Public, No. 792, approved March 3, 1931.)

S. 6106, authorized the Leo N. Levi Memorial Hospital to mortgage its property in Hot Springs National Park. (Public, No. 770, approved March 2, 1931.)

S. 6171, amended the authority of the Secretary of the Interior to assess and collect examination and registration fees from physicians and bath attendants at Hot Springs National Park. (Public, No. 771, approved March 2, 1931.)

S. 6279, authorized the National Capital Park and Planning Commission to provide a suitable memorial in connection with the park and playground system of the National Capital on the George Washington Parkway, to the late Stephen T. Mather, former Director of the National Park Service and ex officio member of the National Capital Park and Planning Commission. (Public, No. 861, approved March 4, 1931.)

H. R. 8534, authorized the transfer of jurisdiction over the Sullys Hill National Park from the Department of the Interior to the Department of Agriculture, to be maintained as the Sullys Hill National Game Preserve. (Public, No. 826, approved March 3, 1931.)

H. R. 10576, authorized exchange of lands with owners of private land holdings within the Chaco Canyon National Monument. (Public, No. 674, approved February 17, 1931.)

H. R. 12404, amended the National Park Roads and Trails act of April 9, 1924, so as to provide for national park approaches. (Public, No. 592, approved January 31, 1931.)

H. R. 13249, authorized the acceptance of a tract of land adjoining Hot Springs National Park for an addition thereto. (Public, No. 651, approved February 14, 1931.)

H. R. 15008, authorized the extension of the south and east boundaries of the Mount Rainier National Park so as to include approximately 34,000 acres of land formerly a part of the Rainier National Forest. (Public, No. 584, approved January 31, 1931.)

H. R. 15867, authorized the retention by the United States of a site within the Hot Springs National Park formerly occupied by the Arlington Hotel and Bathhouse, for park and landscape purposes. (Public, No. 659, approved February 14, 1931.)

H. R. 15876, authorized the addition by presidential proclamation of certain lands adjacent to Mesa Verde National Park, to protect the landscape along the Point Lookout Road, an approach road to the park. (Public, No. 737, approved February 26, 1931.)

H. R. 15877 authorized exchanges of land with owners of private land holdings within the Craters of the Moon National Monument. (Public, No. 714, approved February 21, 1931.)

H. R. 15987 authorized the President by proclamation to establish the Canyon de Chelly National Monument within the Navajo Indian Reservation, Ariz. (Public, No. 667, approved February 14, 1931.)

H. R. 16116 authorized the addition by presidential proclamation of approximately 6,360 acres to the Bryce Canyon National Park and eliminated therefrom 1,240 acres. (Public, No. 675, approved February 17, 1931.)

H. R. 17005 authorized the establishment of the Isle Royale National Park in the State of Michigan when necessary lands have been turned over to the United States. (Public, No. 835, approved March 3, 1931.)

*OTHER MEASURES INTRODUCED OR PENDING IN THE THIRD SESSION
OF THE SEVENTY-FIRST CONGRESS WHICH FAILED OF ENACTMENT*

A bill to establish the Everglades National Park, in the State of Florida, was introduced and favorably reported upon by the National Park Service.

Bills to establish the following additional national parks were introduced and adversely reported upon by the National Park Service: Royal Gorge National Park; Ouachita National Park, Ark.; Grand Coulee National Park, Wash.; Roosevelt National Park, N. Dak.; and Killdeer Mountain National Park, N. Dak.

Bills to establish the following additional national parks and monuments were introduced and referred to the Public Lands Committee, but not to the National Park Service for report: The Daniel Freeman Homestead; a national park in the State of Texas; Fort Boonesboro National Monument, Ky.; Wichita Mountains National Park, Okla.; and Silver Creek Falls National Park, Oreg.

Other new bills introduced affecting the national parks proposed authorizing the department to permit J. B. Wofford to excavate for buried treasure alleged to be buried in the Gran Quivira National Monument (S. 2798; H. R. 7740); the giving of authority to the States of Montana, Idaho, and Wyoming to tax persons and corporations, their franchises and property within that portion of the Yellowstone National Park lying within the boundary lines of the respective States (S. 3049; H. R. 10294); accepting the grant by the State of Montana of concurrent police jurisdiction over the rights of way of the Blackfeet Highway and over the rights of way of its connections with the Glacier National Park road system on the Blackfeet Indian Reservation, Mont. (H. R. 4021); and the removal of the Otter Cliffs radio station to a site within the Acadia National Park, Me. S. Res. 316 (February 26, 1929), authorizing and directing the Committee on Public Lands to investigate the advisability of establishing additional national parks, was extended until the end of the Seventy-first Congress by S. Res. 252 (April 21, 1930), and until the end of the Seventy-second Congress by S. Res. 413 (January 26, 1931).

H. R. 8283 and 8284, which were introduced by Mr. Cramton, provided for a change in name of Platt National Park to Platt National Monument and the alternative of abolishing the park and providing for the disposal of the lands therein to the State of Oklahoma for a State park, respectively. Both bills were reported on favorably by the Secretary of the Interior.

PRESIDENTIAL PROCLAMATIONS

The President signed the following proclamations affecting the national parks and monuments:

November 14, 1930, adding 11,010 acres to the Petrified Forest National Monument.

December 19, 1930, adding 8.6788 acres to the Aztec Ruins National Monument.

December 30, 1930, establishing the Colonial National Monument, containing 1,960.76 acres.

January 5, 1931, adding 16,080 acres to the Bryce Canyon National Park.

March 30, 1931, establishing the George Washington Birthplace National Monument, containing 273.66 acres.

April 1, 1931, establishing Canyon de Chelly National Monument, containing 83,840 acres.

April 13, 1931, adding 1,926.35 acres to the Pinnacles National Monument.

April 24, 1931, adding 1,609,600 acres to the Katmai National Monument.

May 4, 1931, adding 5,982.52 acres to the Bryce Canyon National Park.

EXECUTIVE ORDERS

On November 14, 1930, there were temporarily withdrawn 1,280 acres from which private interests could select land in lieu of privately owned lands within the Craters of the Moon National Monument.

On March 7, 1931, 28,640 acres in Utah were temporarily withdrawn for investigation to determine the suitability of establishing what would be known as the Kolob National Monument.

On August 12, 1931, there were temporarily withdrawn 7,890.72 acres for investigation and classification for an addition to the Dinosaur National Monument.

RECOMMENDATIONS

Realizing fully the seriousness of the present financial condition of the Government, I do not urge larger appropriations for the National Park Service activities, although certain of our activities are not provided for. Nevertheless, I do want to record here, even at the risk of reiterating previous proposals in earlier reports, the most serious needs of the Service, and the national park system:

1. Many national parks and monuments should have their boundaries revised to include territory naturally belonging to them and essential in their protection and development. Park extensions can be made now at little, if any, additional cost to the Government. Delay will impair land values for park purposes and make acquisition more difficult.

2. There are a few new parks that should be established. In a few years it will be too late to establish new members of the system. Revival of business may bring in its train exploitation of potential park areas, rendering them unfit for park status.

3. The military parks and monuments logically belong to the system and should be transferred to the jurisdiction of the National Park Service as recommended by several Secretaries of War.

CONCLUSION

It is a pleasure to look back over the achievements of the past year. It was not a period of spectacular developments here and there, but rather one of steady forward progress in all lines, consolidating the gains of past years, reorganizing where necessary, and generally strengthening the fabric of national-park structure.

The increase in travel, already referred to, has made me particularly happy, since it has shown that the national parks and monuments have a very useful function in times of stress as well as in those of prosperity. More and more our people are coming to realize the soothing influences of outdoor life on tired nerves, and to utilize more fully the advantages along this line placed at their disposal in our national park and monument system.

In closing, I want to express my sincere thanks to those who have made possible the successful achievements of the year just terminated. To the ability and faithfulness of our own personnel, verging often on self-sacrifice; the counsel of officers of the Department of the Interior; and the understanding and fair-minded consideration of Budget officers and members of the congressional appropriations committees of our problems and needs, based on careful study of the parks and monuments, is due most of the credit for this success. To work with such associates is inspiring.

I also want to express here the appreciation of the National Park Service of the ready cooperation furnished this bureau by technical and scientific bureaus of both this and other executive departments. Through taking advantage of the expert service thus available, the Service has achieved the best results at a minimum of cost to the Federal Treasury.

Based on the results of last year, officials of the Service face 1931-32 with enthusiasm and high hopes for a banner year along all lines of endeavor.

Respectfully submitted.

HORACE M. ALBRIGHT, *Director.*

APPENDIX A

ORGANIZATION OF THE NATIONAL PARK SERVICE

(Department of the Interior, Washington, D. C.)

Horace M. Albright, director.
Arno B. Cammerer, associate director.
A. E. Demaray, senior assistant director, branch of operations.
G. A. Moskey, assistant director, branch of use, law, and regulation.
Harold C. Bryant, assistant director, branch of research and education.
Conrad L. Wirth, assistant director, branch of lands.
Isabelle F. Story, editor, chief, division of public relations.
Charles L. Gable, chief auditor, park operators' accounts.
R. M. Holmes, chief clerk.
Everett E. Tillett, chief accountant.
Charles R. Brill, chief, mails and files.

FIELD SERVICE

CIVIL ENGINEERING DIVISION

(409 Underwood Building, San Francisco, Calif.)

Frank A. Kittredge, chief engineer.

LANDSCAPE ARCHITECTURAL DIVISION

(409 Underwood Building, San Francisco, Calif.)

Thomas C. Vint, chief landscape architect.

FIELD EDUCATIONAL AND FORESTRY HEADQUARTERS

(333 Hilgard Hall, University of California, Berkeley, Calif.)

Ansel F. Hall, senior park naturalist and forester.

John D. Coffman, fire expert.

Carl P. Russell, field naturalist.

WILD LIFE SURVEY

(333 Hilgard Hall, University of California, Berkeley, Calif.)

George M. Wright, park naturalist aid.

Joseph S. Dixon, field naturalist.

Ben H. Thompson, park naturalist aid.

FISH-CULTURAL INSPECTIONS AND ACTIVITIES

(P. O. Box 988, Salt Lake City, Utah)

Fred J. Foster, district supervisor, Bureau of Fisheries.

SANITARY ENGINEERING

(420 Call Building, San Francisco, Calif.)

H. B. Hommon, sanitary engineer, Public Health Service.

THE NATIONAL PARKS

Acadia, George B. Dorr, superintendent, Bar Harbor, Me.
 Bryce Canyon, Thomas J. Allen, jr., superintendent, Zion National Park, Utah.
 Carlsbad Caverns, Thomas Boles, superintendent, Carlsbad, N. Mex.
 Crater Lake, Elbert C. Solinsky, superintendent, Crater Lake, Oreg.
 General Grant, John R. White, superintendent, Sequoia National Park, Calif.
 Glacier, Eivind T. Scoyen, superintendent, Belton, Mont.
 Grand Canyon, M. R. Tillotson, superintendent, Grand Canyon, Ariz.
 Grand Teton, Samuel T. Woodring, superintendent, Moose, Teton County, Wyo.
 Great Smoky Mountains, J. Ross Eakin, superintendent, Federal Building, Maryville, Tenn.
 Hawaii, Ernest P. Leavitt, superintendent, Hawaii National Park, Hawaii.
 Hot Springs, Dr. George L. Collins, superintendent, Hot Springs National Park, Ark.
 Lassen Volcanic, Lynne W. Collins, superintendent, Mineral, Calif.
 Mesa Verde, C. Marshall Finnan, superintendent, Mancos, Colo.
 Mount McKinley, Harry J. Liek, superintendent, McKinley Park, Alaska.
 Mount Rainier, Owen A. Tomlinson, superintendent, Longmire, Wash.
 Platt, William E. Branch, superintendent, Sulphur, Okla.
 Rocky Mountain, Edmund B. Rogers, superintendent, Estes Park, Colo.
 Sequoia, John R. White, superintendent, Sequoia National Park, Calif.
 Wind Cave, Edward D. Freeland, superintendent, Hot Springs, S. Dak.
 Yellowstone, Roger W. Toll, superintendent, Yellowstone Park, Wyo.
 Yosemite, Charles G. Thomson, superintendent, Yosemite National Park, Calif.
 Zion, Thomas J. Allen, jr., superintendent, Zion National Park, Utah.

THE NATIONAL MONUMENTS

Frank Pinkley, superintendent, Southwestern Monuments, Coolidge, Ariz.¹
 Aztec Ruins, Johnwill Faris, custodian, Aztec, N. Mex.
 Capulin Mountain, Homer J. Farr, custodian, Capulin, N. Mex.
 Casa Grande, Hilding Palmer, custodian, Coolidge, Ariz.
 Chaco Canyon, Frank Fish, custodian, Crownpoint, N. Mex.
 Colonial, William M. Robinson, jr., superintendent, Yorktown, Va.
 Craters of the Moon, Burton C. Lacombe, custodian, Arco, Idaho.
 Devils Tower, George C. Crowe, custodian, Hulett, Wyo.
 El Morro, Evon Z. Vogt, custodian, Ramah, N. Mex.
 George Washington Birthplace, Oliver G. Taylor, engineer in charge, Oak Grove, Westmoreland County, Va.
 Gran Quivira, W. H. Smith, custodian, Gran Quivira, N. Mex.
 Montezuma Castle, Martin L. Jackson, custodian, Camp Verde, Ariz.
 Muir Woods, J. Barton Herschler, custodian, Mill Valley, Calif.
 Natural Bridges, Zeke Johnson, custodian, Blanding, Utah.
 Navajo, John Wetherill, custodian, Kayenta, Ariz.
 Petrified Forest, Charles J. Smith, custodian, Holbrook, Ariz.
 Pinnacles, W. I. Hawkins, custodian, Hollister, Calif.
 Pipe Spring, Charles Leonard Heaton, custodian, Moccasin, Ariz.
 Scotts Bluff, A. N. Mathers, custodian, Gering, Nebr.
 Sitka, Peter Trierschild, custodian, Sitka, Alaska.
 Tumacacori, George L. Boundey, custodian, Tubac, Ariz.
 Verendrye, Adolph Larsen, custodian, Sanish, N. Dak.
 Wupatki, J. C. Clarke, custodian, Flagstaff, Ariz.

NOTE

The following national monuments have no local custodians:

Arches (Utah).	Hovenweep (Utah-Colorado).
Canyon de Chelly (Arizona).	Katmai (Alaska).
Colorado (Colorado).	Lewis and Clark Cavern (Montana).
Dinosaur (Utah).	Rainbow Bridge (Utah).
Glacier Bay (Alaska).	Shoshone Cavern (Wyoming).
Fossil Cycad (South Dakota).	Yucca House (Colorado).

¹ As superintendent of southwestern monuments, Mr. Pinkley is in charge of all monuments in New Mexico, Arizona, Colorado, and Utah, with the exception of the Dinosaur and Colorado National Monuments. His headquarters are at Coolidge, Ariz.

APPENDIX B

NATIONAL PARKS AND NATIONAL MONUMENTS ADMINISTERED BY VARIOUS FEDERAL DEPARTMENTS

NATIONAL PARKS TABLE 1.—*National parks administered by the National Park Service, Department of the Interior*

[Number, 22; total area, 12,542.46 square miles or 8,027,216.36 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area square miles	Area, acres	Total alien lands (acres)	Special characteristics
Acadia ¹ ----- 1919	Maine coast-----	Mount Desert Ferry, Me. Central system.	Feb. 26, 1919 Jan. 19, 1929 ² May 23, 1930 ²	40 Stat. 1178. 45 Stat. 1083. Pub. 248, 71st Cong.	18.06	11,559.32	-----	The group of granite mountains upon Mount Desert Island and also bold point on opposite mainland across Frenchmans Bay; formerly called the Lafayette National Park.
Bryce Canyon ¹ ----- 1928	Southwestern Utah.	Cedar City, Union Pacific system, Marysville, D. & R. G. W.	June 7, 1924 Feb. 25, 1928 ² May 12, 1928 Sept. 15, 1928 ³ June 13, 1930 Jan. 3, 1931 ² Feb. 17, 1931 ² May 4, 1931 ²	43 Stat. 593. 45 Stat. 147. 45 Stat. 502. Became a park. Pub. 352, 71st Cong. Proc. 1930. Pub. 675, 71st Cong. Proc. 1952.	55.06	35,240.08	-----	Box canyon filled with countless array of fantastically eroded pinnacles; best exhibit of vivid coloring of earth's materials.
Carlsbad Caverns----- 1930	Southeastern New Mexico.	Carlsbad, Santa Fe system, Van Horn, Tex., Tex. & Pac., El Paso, Alamogordo, and Carrizozo, Southern Pacific.	May 14, 1930	Pub. 216, 71st Cong.	1.12	719.22	-----	Contains stupendous caverns, not yet wholly explored, with magnificent limestone decorations.
Crater Lake ¹ ----- 1902	Southwestern Oregon.	Medford or Klamath Falls, Southern Pacific, Chiloquin, Great Northern and Southern Pacific.	May 22, 1902	32 Stat. 202-----	249.00	159,360.00	1,946.27	Lake of extraordinary blue in crater of extinct volcano; sides 1,000 feet high; interesting lava formations; fine fishing.
General Grant ¹ ----- 1890	Middle eastern California.	Fresno, Sanger, or Visalia, Santa Fe and Southern Pacific.	Oct. 1, 1890	26 Stat. 650-----	4.00	2,536.00	131.00	Created to preserve the celebrated General Grant Tree, and grove of Big Trees.

¹ General information circulars on these parks may be obtained free on application.² Boundary changed.³ Date acquisition private land as provided by act of June 7, 1924.

NATIONAL PARKS TABLE 1.—*National parks administered by the National Park Service, Department of the Interior*—Continued
 [Number, 22; total area, 12,542.46 square miles or 8,027,216.36 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area square miles	Area, acres	Total alien lands (acres)	Special characteristics
Glacier 1. 1910	Northwestern Montana.	Glacier Park Station and Belton, Great Northern.	May 11, 1910	36 Stat. 354.	1,533.87	981,681.00	19,250.81	Rugged mountain region of unsurpassed alpine character; 250 glacier-fed lakes of romantic beauty; 60 small glaciers, precipices thousands of feet deep; almost sensational scenery of marked individuality; fine trout fishing.
Grand Canyon 1. 1919	North central Arizona.	Grand Canyon Station, Santa Fe system, North Rim motor stage from Cedar City, Utah, Union Pacific; or from Marysvale, Utah, Denver & Rio Grande Western.	Feb. 26, 1919 Feb. 25, 1927; Mar. 7, 1928; 40 Stat. 1175; 44 Stat. 1238; 45 Stat. 200-234	-----	1,009.00	645,808.79	25,325.45	The greatest example of erosion and the most sublime spectacle in the world.
Grand Teton 1. 1929	Northwestern Wyoming.	Victor, Idaho, Oregon Short Line.	Feb. 26, 1929	45 Stat. 1314.	150.00	96,000.00	1,322.04	Includes most spectacular portion of Teton Mountains, an uplift of unusual grandeur.
Great Smoky Mountains 1930	North Carolina and Tennessee.	Maryville, Knoxville & Augusta R. R. (Tenn.), Bryson, Southern R. R. (N. C.).	Aug. 28, 1930	-----	248.24	138,876.50	-----	This area is not to be developed as a national park until at least 427,000 acres have been donated to the United States, as specified in the organic act. Meanwhile the park area of 158,876.50 acres already in Federal ownership is being protected by the National Park Service.
Hawaii 1. 1916	Hawaii.	Interisland steamers from Honolulu.	Aug. 1, 1916 May 1, 1922; Feb. 12, 1927; Apr. 11, 1923; 39 Stat. 432; 42 Stat. 503; 45 Stat. 424; 44 Stat. 1087.	-----	245.00	156,800.00	22.00	Interesting volcanic areas—Kilauea and Mauna Loa, active volcanoes on the island of Hawaii; Haleakala, a huge extinct volcano on the island of Maui.
Hot Springs 1. 1921	Middle Arkansas.	Hot Springs, Rock Island and Missouri Pacific systems.	Mar. 4, 1921	41 Stat. 1407.	1.50	927.00	-----	46 hot springs said to possess healing properties; many hotels and boarding houses; 19 bathhouses under Government supervision. Reserved by Congress in 1832 as the Hot Springs Reservation to prevent exploitation of hot waters.

Lassen Volcanic ¹ ----- 1916	Northern California. Red Bluff, Southern Pacific; Paxton, Western Pacific; Susanville, Southern Pacific.	Aug. 9, 1916 Apr. 26, 1928 ² May 21, 1928 Jan. 19, 1929 ² Apr. 19, 1930 ² July 3, 1930 ² June 29, 1906 ² June 30, 1913 ²	39 Stat. 442. 45 Stat. 466. 45 Stat. 644. 45 Stat. 1081. Pub. 148, 71st Cong. Pub. 507, 71st Cong. 34 Stat. 616. 38 Stat. 82, 83, 84.	163.32	104,526.61	2,906.40	Only active volcano in United States proper; Lassen Peak 10,453 feet; cinder cone, 6,913 feet; hot springs, mud geysers.
Mesa Verde ¹ ----- 1906	Southwestern Colorado. Manco, Denver and Rio Grande Western.	Feb. 26, 1917 Jan. 30, 1922 ²	39 Stat. 938. 42 Stat. 359.	80.11	51,273.42	790.00	Most notable and best preserved prehistoric cliff dwellings in United States, if not in the world. Highest mountain in North America; rises higher above surrounding country than any other mountain in the world.
Mount McKinley ¹ ----- 1917	South central Alaska. McKinley Park Station, United States Alaska Railroad.	Feb. 26, 1917 Jan. 30, 1922 ²	39 Stat. 938. 42 Stat. 359.	2,645.00	1,692,800.00	-----	Largest accessible single peak glacier system; 28 glaciers, some of large size; 48 square miles of glacier; 50 to 500 feet thick; wonderful subalpine wildflower fields.
Mount Rainier ¹ ----- 1899	West central Washington. Ashford, Chicago, Milwaukee, St. Paul and Pacific.	Mar. 2, 1899 May 28, 1926 ² Jan. 31, 1931 ²	30 Stat. 993. 44 Stat. 668. Pub. 584, 71st Cong.	377.78	241,782.00	1,125.59	Sulphur and other springs said to possess healing properties.
Platt.----- 1902	Southern Oklahoma. Sulphur, Santa Fe system and Frisco lines.	July 1, 1902 ² Apr. 21, 1904 ² June 29, 1906	32 Stat. 641, 655 33 Stat. 220. 34 Stat. 837.	1.30	848.31	-----	Heart of the Rockies; snowy range, peaks 11,000 to 14,255 feet altitude; remarkable records of glacial period.
Rocky Mountain ¹ ----- 1915	North Middle Colorado. Longmont, Burlington Route and Colorado & Southern; Loveland, Colorado & Southern; Lyons, Burlington Route; Boulder, Denver Interurban and Colorado & Southern; Fort Collins, Union Pacific and Colorado & Southern; Granby, Denver & Salt Lake.	Jan. 26, 1915 Feb. 14, 1917 ² June 2, 1924 ² June 9, 1926 ² June 21, 1930 ²	38 Stat. 798. 39 Stat. 916. 43 Stat. 252. 44 Stat. 712. Pub. 404, 71st Cong.	400.52	256,336.00	8,708.87	The Big Tree National Park; scores of sequoias 20 to 30 feet in diameter, thousands over 10 feet in diameter; General Sherman Tree, 36.5 feet in diameter and 272.4 feet high; towering mountain ranges; startling precipices; Mount Whitney and Kern River Canyon.
Sequoia ¹ ----- 1890	Middle eastern California. Exeter or Visalia, Santa Fe and Southern Pacific.	Sept. 25, 1890 Oct. 1, 1890 July 3, 1926 ²	26 Stat. 478. 26 Stat. 650. 44 Stat. (pt. 2) 818.	604.00	386,560.00	1,636.97	Cavern having several miles of galleries and numerous chambers containing peculiar formations.
Wind Cave ¹ ----- 1903	South Dakota. Hot Springs, Burlington Route and Chicago & North Western.	Jan. 9, 1903 Mar. 4, 1931 ²	32 Stat. 765. Pub. 843, 71st Cong.	18.89	12,095.00	-----	

¹ General information circulars on these parks may be obtained free on application.² Boundary changed.³ Established as a reservation Apr. 20, 1892.

NATIONAL PARKS TABLE 1.—*National parks administered by the National Park Service, Department of the Interior*—Continued

[Number, 22; total area, 12,542.46 square miles or 8,027,216.36 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area square miles	Area, acres	Total alien lands (acres)	Special characteristics
Yellowstone ¹ 1872	Northwestern Wyoming, southwestern Montana, and northeastern Idaho.	Gardiner, Mont., Northern Pacific; West Yellowstone, Mont., Union Pacific; Cody, Wyo., Burlington Route; Lander, Wyo., Chicago & North Western; Three Forks, Mont., Chicago, Milwaukee, St. Paul and Pacific.	Mar. 1, 1872 Mar. 1, 1929 ²	17 Stat. 32, 33. 45 Stat. 1435.	3,426.00	2,192,640.00	7,194.00	More geysers than in all rest of world together; boiling springs; mud volcanoes; petrified forests; Grand Canyon of the Yellowstone, remarkable for gorgeous coloring; large lakes; many large streams and waterfalls; vast wilderness, one of the greatest wild-bird and animal preserves in the world; exceptional trout fishing.
Yosemite ¹ 1890	Middle eastern California.	Merced, Southern Pacific and Santa Fe; thence Yosemite Valley Railroad to El Portal.	Oct. 1, 1890 Feb. 7, 1905 June 11, 1906 May 28, 1928 ² Mar. 2, 1929 ² Apr. 13, 1930 ²	26 Stat. 650. 33 Stat. 702. 34 Stat. 831. 45 Stat. 787. 45 Stat. 1486. Proc. 1904.	1,162.43	743,959.38	2,531.65	Valley of world-famed beauty; lofty cliffs; romantic vistas; many waterfalls of extraordinary height; 3 groves of Big Trees; High Sierra, Waterwheel Falls; good trout fishing.
Zion ¹ 1919	Southwestern Utah.	Cedar City, Union Pacific system; Marysville, D. & R., G. W.	Nov. 19, 1919 June 13, 1930 ²	41 Stat. 356. Pub. 351, 71st Cong.	148.26	94,887.73	1,121.72	Magnificent gorge (Zion Canyon); depth from 1,500 to 2,500 feet, with precipitous walls; of great beauty and scenic interest.

¹ General information circulars on these parks may be obtained free on application.² Boundary changed.³ In Wyoming, 3,139 square miles; in Montana, 240 square miles; in Idaho, 47 square miles.

[Number, 34; total area, 6,394.31 square miles or 4,092,363.28 acres]

Name	Location	Approaches	When established	Statute reference	Area, acres	Total alien lands (acres)	Special characteristics
Arches.....	Utah.....	Thompson, Rio Grande Western-U. S. 450 to monument.	Apr. 12, 1929	Proc. 1875.....	4,520.00	320.00	Contains extraordinary examples of wind erosion in the shape of gigantic arches, windows, and other unique formations.
Aztec Ruins ¹	New Mexico.....	Aztec, D. & R. G. W.....	Jan. 24, 1923 July 2, 1928 ² Dec. 19, 1930 ²	42 Stat. 2295..... 45 Stat. 2954. Proc. 1928.	25.88	-----	Prehistoric ruin of pueblo type containing 500 rooms and other ruins.
Canyon de Chelly.....	Arizona.....	Gallup, Santa Fe system.....	Apr. 1, 1931	Proc. 1945.....	83,840.00	-----	Many cliff dwellings in caves and crevasses containing records of cultural progress covering longer period than any other ruins discovered in Southwest. Twenty-mile box canyon joined by lateral canyon. Walls of red sandstone from 700 to 1,000 feet high.
Capulin Mountain.....	New Mexico.....	Folsom, Colorado & Southern.	Aug. 9, 1916	39 Stat. 1792.....	680.37	-----	Cinder cone of geologically recent formation.
Casa Grande.....	Arizona.....	Florence, Southern Pacific.....	Mar. 2, 1889 June 22, 1892 ² Dec. 10, 1909 Aug. 3, 1918 June 7, 1926 ²	25 Stat. 961..... Ex. order. 36 Stat. 2504. 40 Stat. 1818. 44 Stat. 698.	472.50	-----	These ruins are one of the most noteworthy relics of a prehistoric age and people within the limits of the United States. Discovered in ruinous condition in 1694.
Chaco Canyon.....	New Mexico.....	Thoreau, Santa Fe system.....	Mar. 11, 1907 Jan. 10, 1928 ²	35 Stat. 2119..... 45 Stat. 2937.	21,512.37	10,266.24	Numerous cliff-dweller ruins, including communal houses, in good condition and but little excavated.
Colonial.....	Virginia.....	Williamsburg or Lee Hall, Chesapeake & Ohio R. R.	Dec. 30, 1930 ²	Proc. 1929.....	1,960.52	-----	Three areas of great historic importance with connecting parkway—Jamestown Island, where first permanent English settlement in America was made in 1607; Williamsburg, seat of government of Colonial Virginia for nearly a century; and Yorktown, scene of the culminating battle of the Revolution.
Colorado.....	Colorado.....	Grand Junction, Denver & Rio Grande Western.	May 24, 1911	37 Stat. 1681.....	13,749.47	-----	Many lofty monoliths; is wonderful example of erosion, and of great scenic beauty and interest.

¹ Donated to United States.

² Boundary changed.

³ From June 22, 1892, until August 3, 1918, classified as a national park.

⁴ Estimated.

⁵ Present boundary not yet definitely determined.

NATIONAL PARKS TABLE 2.—National monuments administered by the National Park Service, Department of the Interior—Continued

[Number, 34; total area, 6,394.31 square miles or 4,092,363.28 acres]

Name	Location	Approaches	When established	Statute reference	Area, acres	Total alien lands (acres)	Special characteristics
Craters of the Moon	Idaho	Arco, Oregon Short Line	May 2, 1924 July 23, 1928 ² July 9, 1930 ²	43 Stat. 1947. 45 Stat. 2959. Proc. 1916.	49,601.90	1,579.96	Best example of fissure lava flows; volcanic region with weird landscape effects.
Devils Tower	Wyoming	Moorecroft, Burlington Route.	Sept. 24, 1906	34 Stat. 3236	1,152.91		Remarkable natural rock tower, of volcanic origin, 1,200 feet in height.
Dinosaur	Utah	Watson, Uintah Ry.	Oct. 4, 1915	39 Stat. 1752	80.00		Deposits of fossil remains of prehistoric animal life of great scientific interest.
El Morro	New Mexico	Gallup or Grant, Santa Fe system.	Dec. 8, 1906 June 18, 1917 ²	34 Stat. 3264. 40 Stat. 1673.	240.00		Enormous sandstone rock eroded in form of a castle, upon which inscriptions have been placed by early Spanish explorers. Contains cliff-dweller ruins. Of great historic, scenic, and ethnologic interest.
Fossil Cycad	South Dakota	Minnekahta, C. B. & Q.	Oct. 21, 1922	42 Stat. 2286	320.00		Area containing deposits of plant fossils.
George Washington Birthplace.	Virginia	Fredericksburg, Richmond, Fredericksburg & Potomac, thence State route No. 37 to monument.	Jan. 23, 1930	Pub. No. 34, 71st Cong.	384.62		Site of home in which George Washington was born rehabilitated and replica of the old homestead erected.
Glacier Bay	Alaska	Juneau, by boat	Feb. 26, 1925	43 Stat. 1989	1,164,800.00		Contains tidewater glaciers of first rank.
Gran Quivira	New Mexico	Mountainair, Santa Fe system.	Nov. 1, 1909 Nov. 25, 1919 ²	36 Stat. 2503. 41 Stat. 1778.	610.94		One of the most important of earliest Spanish mission ruins in the Southwest. Monument also contains pueblo ruins.
Hovenweep	Utah and Colorado.	Mancos, D. & R. G. W.	Mar. 2, 1923	42 Stat. 2299	285.80		Four groups of prehistoric towers, pueblos, and cliff dwellings.
Katmai	Alaska	Sailing vessel from Kodiak, reached by steamship from Seattle.	Sept. 24, 1918 Sept. 5, 1923 Apr. 24, 1931 ²	40 Stat. 1855. Ex. Order No. 3897. Ex. Order No. 1950.	2,697,590.00		Wonderland of great scientific interest in the study of volcanism. Phenomena exist upon a scale of great magnitude. Includes Valley of Ten Thousand Smokes.
Lewis and Clark Cavern. ¹	Montana	Temporarily closed to public.	May 11, 1908 May 16, 1911	35 Stat. 2187. 37 Stat. 1679.	160.00		Immense limestone cavern of great scientific interest, magnificently decorated with stalactite formations. Now closed to public because of depredations by vandals.

Montezuma Castle.....	Arizona.....	Clarkdale, Santa Fe system.	Dec. 8, 1906	34 Stat. 3265.....	\$ 100.00	-----	Prehistoric cliff-dwelling ruin of unusual size situated in a niche in face of a vertical cliff. Of scenic and ethnologic interest.
Muir Woods ¹	California.....	Ferry from San Francisco, thence Mount Tamalpais & Muir Woods R. R.	Jan. 9, 1908 Sept. 22, 1921 ¹	35 Stat. 2174 42 Stat. 2249.	426.43	-----	One of the most noted redwood groves in California, and was donated by the late Hon. William Kent, ex-Member of Congress. Located 7 miles from San Francisco.
Natural Bridges.....	Utah.....	Pack trip from Blanding, Utah, reached by stage from Thompson, Utah, Mancos, Colo., stations on Denver & Rio Grande Western.	Apr. 16, 1908 Sept. 25, 1909 Feb. 11, 1916	35 Stat. 2183 36 Stat. 2502 39 Stat. 1764.	\$ 2,740.00	-----	Three natural bridges, among largest examples of their kind. Largest bridge is 222 feet high, 65 feet thick at top of arch; arch is 28 feet wide; span, 261 feet; height of span, 157 feet. Other two slightly smaller.
Navajo.....	Arizona.....	Gallup, N. Mex. or Flagstaff, Ariz., Santa Fe system.	Mar. 20, 1909 Mar. 14, 1912	36 Stat. 2491 37 Stat. 1735.	360.00	-----	Contains numerous pueblo, or cliff-dweller ruins, in good preservation.
Petrified Forest.....	do.....	Adamana or Holbrook, Santa Fe system.	Dec. 8, 1906 July 31, 1911 ¹ Nov. 14, 1930 ¹	34 Stat. 3266 37 Stat. 1716. Proc. 1927.	36,918.37	8,290.00	Abundance of petrified coniferous trees, one of which forms a small natural bridge. Is of great scientific interest.
Pinnacles.....	California.....	Soledad or Hollister, Southern Pacific.	Jan. 16, 1908 May 7, 1923 ¹ July 2, 1924 ¹ Apr. 13, 1931 ¹	35 Stat. 2177 43 Stat. 1911 43 Stat. 1961. Proc. 1948.	4,906.61	160.00	Many spirelike rock formations, 600 to 1,000 feet high, visible many miles; also numerous caves and other formations.
Pipe Spring.....	Arizona.....	Cedar City, Utah, Union Pacific.	May 31, 1923	43 Stat. 1913.....	40.00	-----	Old stone fort and spring of pure water in desert region. Serves as memorial to early western pioneer life.
Rainbow Bridge.....	Utah.....	Pack trip from Navajo Mountain, Ariz., reached from Gallup, N. Mex., or Flagstaff, Ariz., Santa Fe system.	May 30, 1910	36 Stat. 2703.....	160.00	-----	Unique natural bridge of great scientific interest and symmetry. Height 309 feet above water, and span is 278 feet, in shape of rainbow.
Scotts Bluff.....	Nebraska.....	Gering, Union Pacific.....	Dec. 12, 1919 May 9, 1924 ¹	41 Stat. 1779 Ex. Order No. 4008.	1,893.83	129.70	Region of historic and scientific interest. Many famous old trails traversed by the early pioneers in the winning of the West passed over and through this monument. Cavern of considerable extent, near Cody, not open to visitors at present.
Shoshone Cavern.....	Wyoming.....	Cody, Burlington route.....	Sept. 21, 1909	36 Stat. 2501.....	210.00	-----	Area of great natural beauty and historic interest as scene of massacre of Russians by Indians. Contains 16 totem poles of best native workmanship.
Sitka.....	Alaska.....	Port of call for steamships from Seattle.	Mar. 23, 1910	36 Stat. 2601.....	57.00	-----	

¹ Donated to United States.¹ Boundary changed^{*} Estimated.

NATIONAL PARKS TABLE 2.—*National monuments administered by the National Park Service, Department of the Interior*—Continued
 [Number, 34; total area, 6,394.31 square miles or 4,092,363.28 acres]

Name	Location	Approaches	When established	Statute reference	Area, acres	Total alien lands (acres)	Special characteristics
Tumacacori.....	Arizona.....	Calabasas, Southern Pacific, and El Paso & Southern.	Sept. 15, 1908	35 Stat. 2205.....	10. 00	-----	Ruin of Franciscan mission dating from seventeenth century. Being restored by National Park Service as rapidly as funds permit.
Verendrye.....	North Dakota.....	Sanish, Soo Line.....	June 29, 1917	40 Stat. 1677.....	250. 04	-----	Includes Crowhigh Butte, from which Explorer Verendrye first beheld territory beyond the Missouri River.
Wupatki.....	Arizona.....	Flagstaff, Santa Fe system...	Dec. 9, 1924	43 Stat. 1977.....	2, 234. 10	320. 00	Prehistoric dwellings of ancestors of Hopi Indians.
Yucca House ¹	Colorado.....	Mancoas, Denver & Rio Grande Western.	Dec. 19, 1919	41 Stat. 1781.....	9. 60	-----	Located on eastern slope of Sleeping Ute Mountain. Is pile of masonry of great archeological value, relic of prehistoric inhabitants.

¹ Donated to United States.

NATIONAL PARKS TABLE 3.—*National monuments administered by the Department of Agriculture*

[Number, 16; total area, 596.22 square miles or 381,185 acres]

Name	Location	Approaches	When established	Statute reference	Area, acres	Special characteristics
Bandelier	New Mexico	Santa Fe, Santa Fe system, and Denver & Rio Grande Western.	Feb. 11, 1916	39 Stat. 1764	22,075	Vast number of cliff-dweller ruins of unusual ethnological and educational interest, including ruins of Rito de los Frijoles, Otowi, Tsankawi, and others. Some of the tools, implements, and simple household equipment of the former inhabitants have been restored as they were centuries ago.
Chiricahua	Arizona	Wilcox, Southern Pacific	Apr. 18, 1924	43 Stat. 1946	4,480	Natural rock formations—pillars, balanced rocks, and rock formations resembling animals, faces, etc.
Devils Postpile	California	Laws, Southern Pacific, thence stage to Mammoth.	July 6, 1911	37 Stat. 1715	800	Consists of peculiar hexagonal basaltic columns, like an immense pile of posts. The columns lie in the pile at all angles from vertical to almost horizontal. Said to rank with famous Giant's Causeway of Ireland.
Gila Cliff Dwellings	New Mexico	Silver City, via Pinos Altos, Santa Fe system.	Nov. 16, 1907	35 Stat. 2162	160	Cliff-dweller ruins. Four natural cavities in the face of an overhanging cliff 150 feet high, of a grayish-yellow volcanic formation, are divided into small rooms by walls built of adobe and small stones, which are in a good state of preservation. The ruins are situated in a rough and broken country and are accessible only by trail.
Holy Cross	Colorado	Redcliff, Denver & Rio Grande	May 11, 1929	Proc. 1877	1,392	2 crevices on side of Mount of the Holy Cross, which, when filled, or partially filled, with snow form a figure in the shape of a Greek cross. Object of much public and religious interest.
Jewel Cave	South Dakota	Custer, Burlington route	Feb. 7, 1908	35 Stat. 2180	11,280	Cavern of limestone formation. Consists of a series of chambers, connected by narrow passages, with numerous side galleries.
Lava Beds	California	Mount Hebron, Southern Pacific.	Nov. 21, 1925	44 Stat. 2591	45,967	Unusual and unique exhibits of peculiar lava and lava flows in the shape of peculiar lava caves and tunnels in great numbers and of considerable size. In many of these caves rivers of perpetual ice are found and Indian petroglyphs carved and painted upon their walls indicate possible occupancy by early historic and prehistoric races. Battle ground of Modoc Indian war of 1873.
Lehman Caves	Nevada	Ely, Nevada Northern	Jan. 24, 1922	42 Stat. 2260	593	Caves of light-gray and white limestone, honey-combed by tunnels and galleries of stalactite formations.

1 Estimated.

NATIONAL PARKS TABLE 3.—*National monuments administered by the Department of Agriculture*—Continued

[Number, 16; total area, 596.22 square miles or 381,185 acres]

Name	Location	Approaches	When established	Statute reference	Area, acres	Special characteristics
Mount Olympus	Washington	Port Angeles by ferry from Seattle.	Mar. 2, 1909 Apr. 17, 1912 May 11, 1915	35 Stat. 2247. 37 Stat. 1737. 39 Stat. 1726.	298, 730	Contains many objects of unusual scientific interest, including numerous glaciers. It is a real wilderness area, having no settlements, no supply points, nor human habitations within it. Bands of the rare Roosevelt elk, numbering several thousand head, of a species native to the region and not found elsewhere, have their summer feeding grounds within the monument area.
Old Kasaan	Alaska	Steamships, Seattle to Ketchikan.	Oct. 25, 1916	39 Stat. 1812.	38	Abandoned Haida Indian village in which remain totem poles, grave houses and monuments, and portions of the original framework of the buildings.
Oregon Caves	Oregon	Grants Pass, Southern Pacific.	July 12, 1909	36 Stat. 2497.	480	Caves in limestone formation of great variety and beauty. These assume odd, grotesque, and fantastic forms of considerable extent and are situated in an attractive environment.
Sunset Crater	Arizona	Flagstaff, Santa Fe system.	May 26, 1930	Proc. No. 1911.	3, 040	A volcanic crater with lava flows and ice caves, near famous San Francisco Peaks.
Timpanogos Cave	Utah	American Fork, Union Pacific system; D. & R. G. W.	Oct. 14, 1922	42 Stat. 2285.	250	Limestone cavern. The cave is almost 600 feet in length. Many beautiful effects are emphasized by the electric lights installed in the cave.
Tonto	Arizona	Globe, Southern Pacific.	Dec. 19, 1907	35 Stat. 2168.	1 640	Two cliff-dweller ruins just off the Roosevelt Globe Highway, one to the southwest of the road and the other on the west side of the canyon. They consist of two and three storied walls of adobe with the supporting beams and lintels of windows and low doors still in place.
Walnut Canyon	do.	Flagstaff, Santa Fe system.	Nov. 30, 1915	39 Stat. 1761.	960	Contains cliff dwellings of marked scientific and popular interest built in under the outward sloping canyon walls, utilizing the projecting limestone ledges as foundations. Instead of being of the communal type, these cliff houses were apparently built for separate families and contain from six to eight rooms.
Wheeler	Colorado	Wagon Wheel Gap or Creede, Denver & Rio Grande Western.	Dec. 7, 1908	35 Stat. 2214.	300	Volcanic formations of unusual scientific interest as illustrating erratic erosion. Unusual combination of fantastic pinnacles and interesting gorges.

† Estimated.

NATIONAL PARKS TABLE 4.—National monuments administered by the War Department

[Number, 21; total area, 646.31 acres]

Name	Location	Approaches	When established	Statute reference	Area, acres	Special characteristics
Abraham Lincoln's Birthplace Memorial, Big Hole Battlefield.	Kentucky	Hodgenville, Illinois Central	July 17, 1916	39 Stat. 385	110.50	Contains the log cabin and part of the farm where Abraham Lincoln was born.
Brices Cross Roads.	Montana	Divide, Union Pacific.	June 23, 1910	Ex. Order	5.00	Site of battlefied on which battle was fought Aug. 9, 1877, between a small force of United States troops and a much larger force of Nez Perce Indians, resulting in rout for the Indians.
Cabrillo.	Mississippi	Baldwyn, Mobile & Ohio.	Feb. 21, 1929	45 Stat. 1254	1.00	Civil War Battle of Brices Cross Roads—June 10, 1864.
Castle Pinckney.	California	San Diego, Southern Pacific and Santa Fe system.	Oct. 14, 1913 May 12, 1926	38 Stat. 1965 44 Stat. 2612	.50	Of historic interest because of discovery of the territory now partly embraced in the State of California by Juan Rodriguez Cabrillo, who at this point first sighted land on Sept. 28, 1542.
Chalmette.	South Carolina	Charleston, A. C. L., S. A. L., Southern.	Oct. 15, 1924	43 Stat. 1968	3.50	Fortification built in 1810 to replace a Revolutionary fort.
Cowpens.	Louisiana	New Orleans, N. O. & N. E., Louisville & Nashville.	Mar. 4, 1907	34 Stat. 1411	17.47	Erected in memory of the Battle of New Orleans, which was fought on Jan. 8, 1815.
Fort Marion.	South Carolina	Cowpens, Southern R. R.	Mar. 4, 1929	45 Stat. 1558	1.00	Site of Revolutionary War Battle of Cowpens, Jan. 17, 1781.
Fort Matanzas.	Florida	St. Augustine, Florida E. C.	Oct. 15, 1924	43 Stat. 1968	18.09	Fort built by Spaniards in 1656.
Fort McHenry.	do	do	do	do	1.00	Relic of Spanish invasion.
Fort Niagara.	Maryland	Baltimore, Philadelphia, Baltimore & Washington.	Mar. 3, 1925	43 Stat. 1109	46.75	Restored and preserved as birthplace of "Star Spangled Banner."
Fort Pulaski.	New York	Lewiston, New York Central	Sept. 5, 1925	44 Stat. 2582	.0074	Site for erection of cross to commemorate a cross erected by Father Millett in 1688 on what is now the Fort Niagara Military Reservation.
Fort Wood.	Georgia	Pulaski, Central of Georgia.	Oct. 15, 1924	43 Stat. 1968	20.00	Built in 1810 to replace Fort Greene of the Revolution.
Kenesaw Mountain.	New York	New York City.	do	do	2.50	Site of the Statue of Liberty.
Kitty Hawk.	Georgia	Marietta, via Nashville, Chattanooga & St. Louis.	Feb. 15, 1928	do	60.00	Site of important Civil War engagement fought June 27, 1864.
Meriwether Lewis.	North Carolina	Elizabeth City, Eastern N. R. Line.	Mar. 2, 1927	44 Stat. 1264	None.	Scene of first sustained flight by heavier-than-air machine.
Monocacy.	Tennessee	Hohenwald, N. C. & St. L.	Feb. 6, 1925	43 Stat. 1986	300.00	Contains grave of Captain Lewis of the Lewis and Clark Expedition.
Mound City Group.	Maryland	Near Sharpsburg, Norfolk & Western.	Mar. 1, 1929	45 Stat. 1444	1.00	Site of Civil War Battle of Monocacy.
New Echota.	Ohio	Chillicothe, B. & O. and N. & W.	Mar. 2, 1923	42 Stat. 2298	57.00	Famous group of prehistoric mounds in Camp Sherman Military Reservation.
White Plains Battlefield.	Georgia	Echota, N. C. & St. L. R. R.	May 28, 1930	46 Stat. 431	1.00	Site of Capitol of Cherokee Indians.
	Mississippi	Baldwyn, Mobile & Ohio.	Feb. 21, 1929	45 Stat. 1254	None.	Commemorates the Battle of Tupelo.
	New York	White Plains, New York Central.	May 18, 1926	44 Stat. 562	None.	Memorial tablet to indicate the position of the Revolutionary Army under the command of General Washington.

NATIONAL PARKS TABLE 5.—*National military and other parks administered by the War Department*

[Number, 11; total area, 22 square miles or 14,131.86 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area, acres	Special characteristics
Antietam Battlefield	Maryland	Antietam, Norfolk & Western	Aug. 30, 1890	26 Stat. 401	40.00	Scene of one of the greatest battles of the Civil War.
Chickamauga and Chattanooga	Georgia and Tennessee	Chattanooga, several southern roads.	Aug. 19, 1890 Mar. 3, 1891	26 Stat. 333 26 Stat. 978	6,541.64	Beautiful natural park; embraces battlefields of Chickamauga and Missionary Ridge and scenes of other conflicts of the Civil War fought in the vicinity of Chattanooga during 1863.
Fredericksburg and Spotsylvania	Virginia	Fredericksburg, R., F. & P	Feb. 14, 1927	44 Stat. 1091	None.	Scene of battles of Fredericksburg, Spotsylvania, Wilderness, Chancellorsville, and Salem Church at or near Fredericksburg.
Fort Donelson Gettysburg ¹	Tennessee Pennsylvania	Erin, Louisville & Nashville Gettysburg, Philadelphia & Reading and Western Maryland.	Mar. 26, 1928 Feb. 11, 1895	45 Stat. 367 28 Stat. 651	None. 2,316.86	Site of Civil War fort; now military cemetery. Beautiful natural park; scene of Civil War combat; probably better marked than any other battlefield in the world.
Guilford Courthouse	North Carolina	Greensboro, Southern and Atlantic & Yadkin	Mar. 2, 1917	39 Stat. 996	110.46	Near Greensboro; scene of one of the great battles of the Revolution; fought in 1781.
Moore's Creek	do	Burgaw, A. C. Line	June 2, 1926	44 Stat. 684	30.00	Scene of one of most memorable battles of Revolutionary War.
Petersburg	Virginia	Petersburg, Seaboard Air Line, Atlantic Coast Line, and N. & W.	July 3, 1926	44 Stat. 822	185.00	Scene of campaign and siege and defense of Petersburg, Virginia, in 1864 and 1866.
Shiloh	Tennessee	Corinth, Miss., Illinois Central and Southern.	Dec. 27, 1894	28 Stat. 597	3,583.69	Natural park embracing the battlefield of Shiloh near Pittsburg Landing.
Stones River	do	Murfreesboro, Nashville, Chattanooga & St. Louis.	Mar. 3, 1927	44 Stat. 1399	None.	Scene of the Battle of Stones River in Tennessee.
Vicksburg	Mississippi	Vicksburg, Alabama & Vicksburg, Vicksburg, Shreveport & Pacific, and Yazoo & Mississippi Valley.	Feb. 21, 1899	30 Stat. 841	1,324.21	Beautiful natural park; scene of the siege and surrender of Vicksburg in 1863 during the Civil War.

¹ Donated in whole or in part to the United States.

NATIONAL PARKS TABLE 6.—Holdings acquired by deed for national park and monument purposes

Parks and monuments	Holdings acquired from July 1, 1930, through Sept. 30, 1931					Total holdings acquired through Sept. 30, 1931
	Holdings acquired by purchase		Holdings acquired otherwise than by purchase		Total area acquired in acres	
	Government funds	Donated funds	Area in acres	How acquired		
1. Acadia National Park	\$1,500.00		6.88	Donation	1,438.62-A	10,120.70
2. Aztec Ruins National Monument				do	1.80-B	17.20
3. Carlsbad Caverns National Park				Donation	270.73-C	1.00
4. Colonial National Monument	474,714.14		1,678.19	{By transfer, War Department. By transfer, Treasury Department.	{10.34 1.26}	1,960.52
5. Crater Lake National Park				Donation (right of way)	D	.75
6. Craters of the Moon National Monument	20,000.00		20.00	{Donation {Transfer, War Department.	{372.74-E 11.88}	20.00
7. General Grant National Park				Donation, State of North Carolina	12,081.83	384.62
8. George Washington Birthplace National Monument				Donation	166.62	166.62
9. Glacier National Park	204,400.00		166.62	Donation	12,081.83	146,794.67
10. Great Smoky Mountains National Park				Donation	16.00	156,800.00
11. Hawaii National Park				Donation	80.00-F	16.00
12. Hot Springs National Park				Donation (right of way)	30.20-G	400.00
13. Lassen Volcanic National Park	15,100.00	\$15,100.00	280.00	Donation	1,926.27-H	320.20
14. Mesa Verde National Park				Donation		426.43
15. Muir Woods National Monument				Donation		1,926.27
16. Pinnacles National Monument				Donation		321.76
17. Rocky Mountain National Park				Donation		3,294.25
18. Sequoia National Park	12,440.00	\$12,440.00	1,441.87	Donation		3,294.25
19. Elk Refuge north of Yellowstone National Park				Donation		3,294.25
20. Yosemite National Park	35,000.00	\$10,000.00	80.00	Donation	520.00-I	26,822.89
21. Zion National Park	44,845.00	\$20,000.00	659.14	Donation	659.14	18,077.21
22. Yucca House National Monument				Donation		9.60
Total	807,999.14	57,540.00	4,332.70		16,745.67	345,397.24
						365,033.74

NOTE.—Prior to Oct. 1, 1931, the Government expended \$2,051,580.61. During that period \$1,683,317.80 and many acres of land were donated.

TABLE OF PRIVATE HOLDINGS ACQUIRED

Donated funds

1 Pacific Gas and Electric Co.

2 Thomas Sidebottom, \$4,600; Game Preservation Co. \$7,840.

3 The Green Investment Co., et al.

4 Union Pacific Railroad Co.

TABLE OF PRIVATE HOLDINGS ACQUIRED—Continued

<i>Donated land</i>		Acres
A. Hancock County Trustee of Public Reservations.....	1,131.32	99.06
Lafayette National Park Museum of Stone Age Antiquities.....	2.3	
John D. Rockefeller, Jr.....	305	
B. American Museum of Natural History.....		273.66
C. Jamestown Corporation.....	41.88	
Martha G. Jaeger.....	85	
D. J. M. Dozier.....	228.00	
Edward B. Arthur.....		
Kilpatrick Brothers.....		
E. Wakefield National Memorial Association.....		
River Holding Corporation.....		
F. Emma A. Krikava.....		
G. Fred C. Hallar.....		
H. County of San Benito, Calif.....		
I. Don Tresidder.....		
Mary Curry Tresidder.....		

APPENDIX C

TRAVEL AND FISCAL STATISTICS

NATIONAL PARKS TABLE 7.—*Visitors to the national parks, 1916-1931*

Name of park	1916	1917	1918	1919	1920	1921	1922	1923
Acadia ¹				² 64, 000	² 66, 500	² 69, 836	73, 779	64, 200
Crater Lake.....	12, 265	11, 645	13, 231	16, 645	20, 135	28, 617	33, 016	52, 017
General Grant.....	15, 360	17, 390	15, 496	21, 574	19, 661	30, 312	50, 456	46, 230
Glacier.....	12, 839	18, 387	9, 086	18, 956	22, 449	19, 736	23, 935	33, 988
Grand Canyon.....				37, 745	67, 315	67, 485	84, 700	102, 166
Hawaii.....	(³)	(³)	(³)	(³)	(³)	² 16, 071	27, 750	411
Hot Springs.....	² 118, 740	² 135, 000	² 140, 000	² 160, 490	² 162, 850	² 130, 968	² 106, 164	² 112, 000
Lassen Volcanic.....	(³)	² 8, 500	² 2, 000	² 2, 500	² 2, 000	² 10, 000	² 10, 000	² 9, 500
Mesa Verde.....	1, 385	2, 223	2, 058	2, 287	2, 890	3, 003	4, 251	5, 236
Mount McKinley.....		(³)	(³)	(³)	(³)	(³)	⁵ 7	⁵ 34
Mount Rainier.....	23, 989	35, 568	43, 901	55, 232	56, 491	55, 771	70, 371	123, 708
Platt.....	² 30, 000	² 35, 000	14, 431	26, 312	27, 023	² 60, 000	² 70, 000	² 117, 710
Rocky Mountain.....	² 51, 000	117, 186	101, 497	169, 492	240, 966	² 273, 737	⁴ 219, 164	218, 000
Sequoia.....	10, 780	18, 510	15, 001	30, 443	31, 508	28, 263	27, 514	30, 158
Sullys Hill.....	² 1, 500	2, 207	4, 188	4, 026	9, 341	9, 100	² 9, 548	8, 478
Wind Cave.....	² 9, 000	16, 742	² 36, 000	² 25, 000	² 38, 000	28, 336	31, 016	41, 505
Yellowstone.....	35, 849	35, 400	21, 275	62, 261	79, 777	81, 651	98, 223	138, 352
Yosemite.....	33, 390	34, 510	33, 497	58, 362	68, 906	91, 513	100, 506	130, 046
Zion.....					3, 692	2, 937	4, 109	6, 408
Total.....	356, 097	488, 268	451, 661	755, 325	919, 504	1, 007, 335	1, 044, 502	1, 280, 886

Name of park	1924	1925	1926	1927	1928	1929	1930	1931
Acadia ¹	71, 758	73, 673	101, 256	123, 699	134, 897	149, 554	154, 734	162, 238
Bryce Canyon.....						21, 997	35, 982	41, 572
Carlsbad Caverns ⁶							90, 104	81, 275
Crater Lake.....	64, 312	65, 018	86, 019	82, 354	113, 323	128, 435	157, 693	170, 284
General Grant.....	35, 020	40, 517	50, 597	47, 996	51, 988	44, 783	43, 547	51, 995
Glacier.....	33, 372	40, 063	37, 325	41, 745	53, 454	70, 742	73, 776	63, 497
Grand Canyon.....	108, 256	134, 053	140, 252	162, 356	167, 226	184, 093	172, 763	156, 964
Grand Teton.....						² 51, 500	² 60, 000	
Great Smoky Moun- tains.....								² 154, 000
Hawaii.....	52, 110	64, 155	² 35, 000	37, 551	78, 414	109, 857	89, 578	124, 932
Hot Springs.....	² 164, 175	² 265, 500	² 260, 000	² 181, 523	² 199, 099	184, 517	167, 062	153, 394
Lassen Volcanic.....	² 12, 500	² 12, 956	18, 739	20, 089	26, 057	26, 106	31, 755	56, 833
Mesa Verde.....	7, 109	9, 043	11, 356	11, 915	16, 760	14, 517	16, 656	18, 003
Mount McKinley.....	⁵ 62	⁵ 206	⁵ 533	⁵ 651	⁵ 802	1, 038	951	771
Mount Rainier.....	161, 473	173, 004	161, 796	200, 051	219, 531	217, 783	265, 620	293, 562
Platt.....	² 134, 874	² 143, 380	² 124, 284	² 294, 954	² 280, 638	² 204, 598	² 178, 188	⁷ 325, 000
Rocky Mountain.....	224, 211	233, 912	² 225, 027	² 229, 862	² 235, 057	² 274, 408	255, 874	265, 663
Sequoia.....	34, 468	46, 677	89, 404	100, 684	98, 035	111, 385	129, 221	143, 573
Sullys Hill.....	8, 035	9, 183	19, 921	22, 632	24, 979	21, 004	21, 293	(⁸)
Wind Cave.....	52, 166	69, 267	85, 466	81, 023	100, 309	108, 943	88, 000	² 85, 000
Yellowstone.....	144, 158	154, 282	187, 807	200, 825	230, 984	260, 697	227, 901	221, 248
Yosemite.....	105, 894	209, 166	274, 209	490, 430	460, 619	461, 257	458, 566	461, 855
Zion.....	8, 400	16, 817	21, 964	24, 303	30, 016	33, 383	55, 297	59, 186
Total.....	1, 422, 353	1, 760, 872	1, 930, 955	2, 354, 643	2, 522, 188	2, 680, 597	2, 774, 561	3, 152, 845

¹ Formerly Lafayette National Park.

² Estimated.

³ No record.

⁴ Indicated loss in travel from 1921 due largely to better methods of checking and estimating employed.

⁵ Actual park visitors; some miners and prospectors also passed through park.

⁶ National park established by act of May 14, 1930. Formerly a national monument.

⁷ Much of this travel, which is estimated, originated in the locality.

⁸ By act of Congress of Mar. 3, 1931, this area was transferred to the Department of Agriculture to be administered as a game preserve.

NATIONAL PARKS TABLE No. 8.—Detail comparative statistics of travel and campers, 1930-31

Name of park	Number of private automobiles		Visitors by private automobiles		Visitors by stage and rail		Visitors by other means		Total visitors		Number of campers	
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931
Acadia.....	37, 118	40, 393	145, 534	155, 788	9, 200	6, 450	(¹)	(¹)	154, 734	162, 238	(¹)	(¹)
Bryce Canyon.....	10, 007	11, 714	32, 047	39, 258	3, 930	2, 308	(¹)	6	33, 982	41, 572	6, 174	7, 348
Carlsbad Caverns.....	28, 340	27, 248	88, 574	79, 580	1, 530	1, 695	(¹)	(¹)	90, 104	81, 275		
Crater Lake:												
North entrance.....	919	1, 362	2, 987	4, 183				13	2, 987	4, 196		
West entrance.....	25, 816	27, 713	78, 754	83, 350	282	198	85	120	79, 121	83, 668		
South entrance.....	19, 807	19, 850	61, 614	60, 106	433	337	71	122	62, 118	60, 565		
East entrance.....	4, 478	7, 264	13, 462	21, 855			5		13, 467	21, 855		
Total.....	51, 020	56, 189	156, 817	169, 494	715	535	161	255	157, 093	170, 284	16, 941	16, 647
General Grant.....	13, 924	16, 245	43, 547	51, 995					43, 547	51, 995	2, 665	4, 412
Glacier.....	18, 318	16, 415	60, 958	53, 289	8, 656	6, 047	4, 162	4, 161	73, 776	63, 497	11, 010	13, 848
Grand Canyon:												
South rim entrance.....	33, 618	34, 147	100, 179	102, 109	49, 890	34, 549	611					
North rim entrance.....	5, 954	5, 697	18, 739	17, 677	3, 331	2, 028	13					
Total.....	39, 572	39, 844	118, 918	119, 786	53, 221	36, 577	624				54, 396	54, 261
Grand Teton.....	20, 000	16, 170	60, 000	61, 198	(¹)	368	(¹)	434	60, 000	62, 000	8, 216	13, 279
Great Smoky Mountains.....	28, 251	31, 026	89, 578	154, 000		(¹)		(¹)	89, 578	154, 000	(¹)	(¹)
Hawaii.....	25, 426	13, 394	81, 820	82, 395	85, 242	70, 999	(¹)		167, 062	153, 394	3, 860	3, 730
Hot Springs.....												
Lassen Volcanic:												
Warner Valley entrance.....	2, 350	2, 401	7, 278	7, 228	(¹)	(¹)	5		7, 283	7, 228		
Juniper Lake entrance.....	2, 713	9, 931	2, 118	2, 866	(¹)	(¹)	(¹)		2, 118	2, 866		
Sulphur Works entrance.....	2, 990	9, 787	10, 485	31, 448	(¹)	(¹)	9		10, 494	31, 450		
Manzanita Lake entrance.....	1, 636	3, 622	4, 628	10, 996	(¹)	(¹)	5	3	4, 633	10, 999		
Lost Creek entrance.....	1, 581	780	4, 839	2, 357	(¹)	(¹)		3	4, 839	2, 357		
Butte Lake entrance.....	1, 626	752	2, 388	1, 933	(¹)	(¹)			2, 388	1, 933		
Total.....	9, 896	18, 267	31, 736	56, 827			19	6	31, 755	56, 833	25, 500	8, 099
Mesa Verde.....	5, 023	5, 334	16, 435	17, 654	147	121	74	228	16, 656	18, 003	10, 504	10, 620
Mount McKinley.....					951	771			951	771		

Mount Rainier:	49,868	47,289	203,825	182,749	10,693	5,935	44	63	214,562	188,747	---
Nisqually entrance.....	---	---	---	---	---	---	---	---	---	---	---
White River entrance.....	2,338	23,493	39,695	92,039	---	---	---	---	39,695	92,039	---
Carbon River entrance.....	2,606	3,083	9,074	10,678	---	---	---	---	9,074	10,678	---
Ohanapecosh entrance.....	---	608	---	2,098	---	---	2,289	---	2,289	2,098	---
Total.....	62,832	74,473	252,594	287,564	10,693	5,935	2,333	63	265,620	293,562	194,572
Platt.....	71,500	---	178,188	2 325,000	(1)	(1)	(1)	(1)	178,188	2 325,000	2 68,140
Rocky Mountain:	---	---	---	---	---	---	---	---	---	---	---
Bear Lake entrance.....	9,980	18,278	35,974	64,846	(1)	(1)	(1)	(1)	---	---	---
Fall River entrance.....	16,245	22,365	56,495	76,165	(1)	(1)	(1)	(1)	---	---	---
High Drive entrance.....	4,975	6,459	17,460	22,384	(1)	(1)	(1)	(1)	---	---	---
Grand Lake entrance.....	11,445	14,621	35,504	46,276	(1)	(1)	(1)	(1)	---	---	---
Other entrances.....	3,780	2,196	19,786	8,006	(1)	(1)	(1)	(1)	---	---	---
Total.....	46,425	63,919	165,219	217,677	7,069	5,602	83,586	42,384	255,874	265,663	11,664
Sequoia:	---	---	---	---	---	---	---	---	---	---	---
Ash Mountain entrance.....	36,205	40,787	115,299	127,316	---	---	---	---	---	---	---
Mineral King entrance.....	3,426	3,914	8,787	9,652	---	---	---	---	---	---	---
Total.....	39,631	44,701	124,086	136,968	317	211	4,818	6,394	129,221	143,573	59,266
Wind Cave.....	20,000	25,000	88,000	2 81,500	(1)	3,500	(1)	(1)	88,000	2 85,000	500
Yellowstone:	---	---	---	---	---	---	---	---	---	---	---
North entrance.....	13,419	13,311	40,548	41,272	9,209	6,693	242	249	49,999	48,214	---
West entrance.....	22,478	21,407	73,029	70,157	12,961	8,872	428	342	86,418	79,371	---
East entrance.....	20,746	21,825	64,825	67,868	4,585	3,203	306	247	69,716	71,318	---
South entrance.....	6,765	7,093	21,512	22,126	90	161	166	58	21,768	22,345	---
Total.....	63,408	63,636	190,914	201,423	26,845	18,929	1,142	896	227,901	221,248	135,613
Yosemite:	---	---	---	---	---	---	---	---	---	---	---
Arch Rock entrance.....	87,022	83,296	265,176	240,541	---	---	---	---	---	---	---
Mariposa Grove.....	13,881	17,098	45,169	55,564	---	---	---	---	---	---	---
Alder Creek.....	10,144	13,561	30,207	41,425	---	---	---	---	---	---	---
Tuolumne Grove.....	12,264	13,565	35,294	37,869	---	---	---	---	---	---	---
Aspen Valley.....	6,567	7,716	17,551	20,458	---	---	---	---	---	---	---
Tioga Pass.....	7,004	10,958	19,334	29,546	---	---	---	---	---	---	---
Nather.....	4,209	4,756	13,178	13,036	---	---	---	---	---	---	---
Total.....	141,091	150,950	425,909	438,439	30,153	20,785	2,504	2,631	458,566	461,855	2 132,000
Zion.....	15,633	18,215	51,202	56,687	4,056	2,438	39	61	55,297	59,186	18,825

1 No record kept.

2 Estimated.

NATIONAL PARKS TABLE 9.—*Visitors to the national monumets, 1926-1931*¹

Name	1926	1927	1928	1929	1930	1931
Arches (Utah).....				² 500	² 400	² 405
Aztec Ruins (New Mexico).....	5,646	7,298	18,359	18,193	12,906	10,710
Canyon de Chelly (Arizona).....						423
Capulin Mountain (New Mexico).....	14,965	12,617	² 7,600	² 12,000	² 16,500	² 18,000
Carlsbad Cave (New Mexico).....	10,904	26,436	46,335	76,822	(³)	(³)
Casa Grande (Arizona).....	16,542	28,818	28,274	37,244	36,656	27,675
Chaco Canyon (New Mexico).....	2,500	² 1,500	1,425	² 2,750	² 2,300	1,780
Colorado (Colorado).....	² 9,000	² 9,500	² 10,000	² 12,000	² 13,000	² 16,000
Craters of the Moon (Idaho).....	4,620	5,771	7,768	7,730	7,365	5,885
Devils Tower (Wyoming).....	16,640	² 10,400	² 8,000	² 12,000	14,720	² 11,000
El Morro (New Mexico).....	5,794	5,178	5,356	2,625	² 3,500	3,854
George Washington Birthplace (Virginia).....					² 10,000	² 22,500
Gran Quivira (New Mexico).....	1,577	2,034	2,779	3,357	4,812	4,232
Hovenweep (Utah-Colorado).....	² 250	263	² 240	² 450	² 400	² 440
Montezuma Castle (Arizona).....	12,385	15,400	16,232	17,824	19,298	14,411
Muir Woods (California).....	97,426	101,514	103,571	93,358	77,311	73,717
Natural Bridges (Utah).....	63	82	175	² 260	² 300	368
Navajo (Arizona).....	² 250	² 260	315	965	215	² 300
Papago Saguaro (Arizona).....	² 53,000	60,540	66,450	² 87,600	² 50,000	(⁴)
Petrified Forest (Arizona).....	53,345	61,761	75,225	69,350	105,433	93,895
Pinnacles (California).....	10,167	11,265	13,216	10,756	11,862	12,813
Pipe Spring (Arizona).....	16,728	16,853	17,321	24,383	8,765	² 2,300
Rainbow Bridge (Utah).....	² 300	² 300	² 200	² 450	325	² 350
Scots Bluff (Nebraska).....	² 27,000	² 30,000	² 37,500	² 42,500	² 48,500	² 48,000
Shoshone Cavern (Wyoming).....			² 300			
Sitka (Alaska).....	² 2,500	² 3,000	² 3,000	² 3,500	² 3,000	² 8,000
Tumacacori (Arizona).....	13,633	16,761	17,341	18,250	15,603	12,036
Verendrye (North Dakota).....	² 8,000	² 15,000	² 15,000	² 11,500	² 8,000	² 2,000
Wupatki (Arizona).....	² 600	² 450	² 500	² 550	654	² 650
Yucca House (Colorado).....	² 150	196	174	² 250	² 240	264
Total.....	384,040	443,197	502,656	567,667	472,095	392,011

¹ No records for other national monuments.² Estimated.³ Made a national park by act of Congress approved May 14, 1930.⁴ National monument status of Papago Saguaro abolished by act of Congress approved Apr. 7, 1930.NATIONAL PARKS TABLE 10.—*Private automobiles entering the national parks during seasons 1924-1931*¹

Name of park	1924	1925	1926	1927	1928	1929	1930	1931
Acadia ^{2 3}	12,561	9,331	15,361	29,181	31,998	35,972	37,118	40,393
Bryce Canyon.....						5,223	10,007	11,734
Carlsbad Caverns ⁷							28,850	27,808
Crater Lake.....	19,301	19,451	26,442	25,667	34,869	39,043	51,020	56,189
General Grant.....	9,118	11,108	12,869	13,172	14,681	12,995	13,924	16,245
Glacier.....	6,756	7,585	6,727	7,980	9,860	14,320	18,318	16,415
Grand Canyon.....	13,052	19,910	22,849	28,479	32,316	37,848	39,572	39,844
Grand Teton.....						⁴ 16,200	⁴ 20,000	16,170
Great Smoky Mountains.....								² 51,000
Hawaii ²	10,150	12,650	⁴ 6,500	8,345	14,505	18,347	28,251	31,026
Hot Springs ²				⁵ 1,559	⁵ 1,455	28,290	25,426	13,394
Lassen Volcanic.....		2,646	5,423	5,899	8,137	8,370	9,896	18,273
Mesa Verde.....	1,803	2,197	3,054	3,315	4,803	4,224	5,023	5,334
Mount Rainier.....	38,351	39,860	38,626	48,275	50,005	51,998	62,866	74,947
Platt ²	⁴ 57,400	⁴ 60,000	45,796	⁴ 75,000	⁴ 70,000	⁴ 65,000	⁴ 71,500	⁴ 100,000
Rocky Mountain ²	⁴ 53,696	⁴ 58,057	⁴ 50,407	⁴ 54,109	⁴ 57,381	67,682	73,101	75,429
Sequoia ⁶	11,032	14,273	26,503	30,165	29,290	33,250	39,631	44,701
Sullys Hill ²		2,271	4,484	⁴ 4,700	5,229	4,936	4,284	(⁵)
Wind Cave ²	17,200	22,598	28,332	26,879	33,300	36,317	⁴ 20,000	⁴ 25,000
Yellowstone.....	30,639	33,063	⁵ 44,326	49,055	58,186	68,415	63,588	63,795
Yosemite.....	32,814	49,229	74,885	137,296	131,639	132,903	141,267	151,126
Zion.....	1,993	3,928	4,796	6,203	7,532	8,612	15,633	18,215
Total.....	315,916	363,212	417,386	557,079	595,253	689,945	779,275	897,038

¹ Automobiles and motor cycles entering parks with or without licenses, to and including Sept. 30, 1931.² No license required.³ Formerly Lafayette National Park.⁴ Estimated.⁵ Count made only at public camp ground.⁶ License required only for Giant Forest Road.⁷ National park established by act of May 14, 1930. Formerly a national monument.⁸ By act of Congress of Mar. 3, 1931, this area was transferred to the Department of Agriculture to be administered as a game preserve.

NATIONAL PARKS TABLE 11.—*Automobile and motor-cycle licenses issued during seasons 1927-1931*

Name of park ¹	1927		1928		1929		1930		1931	
	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles
Crater Lake.....	15,046	18	27,898	46	23,954	46	37,595	10	35,716	51
General Grant.....	6,702	-----	6,380	-----	6,028	-----	7,199	-----	7,397	-----
Glacier.....	5,196	-----	7,350	5	7,577	-----	10,498	7	11,362	-----
Grand Canyon.....	21,629	-----	26,429	-----	29,229	-----	33,780	-----	36,797	-----
Mesa Verde.....	2,959	7	4,256	13	3,926	9	4,599	-----	4,863	-----
Mount Rainier.....	28,340	47	32,885	33	32,184	61	35,498	28	41,217	16
Sequoia ²	16,383	-----	16,599	-----	16,799	-----	20,998	-----	21,802	-----
Yellowstone.....	43,062	191	54,139	179	56,150	159	63,853	187	56,401	176
Yosemite.....	96,580	218	75,213	183	74,229	167	81,365	186	76,678	175
Zion.....	4,069	481	6,107	-----	6,822	-----	10,284	-----	15,754	-----
Total.....	239,966	262	257,256	459	256,898	442	305,669	418	307,987	418

¹ No licenses required for Wind Cave, Hot Springs, Platt, Hawaii, Lassen Volcanic, Sullys Hill, Rocky Mountain, Mount McKinley, and Acadia National Parks.

² License required only for Giant Forest Road.

Licenses not required in certain parks because of small road mileage or unimproved condition of roads (see footnote 1). Licenses also not required for travel on unimproved roads in other parks. No charge for license issued for operating cars on official business.

NATIONAL PARKS TABLE 12.—*Receipts collected from automobiles and motor cycles during seasons 1927-1931*

Name of park ¹	1927	1928	1929	1930	1931
Crater Lake.....	\$15,064.00	\$27,944.00	\$24,000.00	\$37,623.00	\$35,803.00
General Grant.....	3,351.00	3,190.00	3,014.00	3,599.50	3,698.50
Glacier.....	5,196.00	7,355.00	7,577.00	10,506.00	11,362.00
Grand Canyon.....	21,629.00	26,429.00	29,300.00	33,988.00	36,950.00
Mesa Verde.....	2,965.50	4,269.00	3,944.00	4,644.00	4,917.00
Mount Rainier.....	28,387.00	32,918.00	32,245.00	35,526.00	41,233.00
Sequoia ²	16,383.00	16,599.00	16,799.00	20,998.00	21,802.00
Yellowstone.....	129,377.00	162,596.00	168,608.00	192,218.00	169,379.00
Yosemite.....	192,370.00	150,609.00	148,613.00	162,784.00	153,531.00
Zion.....	2,034.50	3,053.50	3,431.50	7,521.00	15,400.00
Total.....	416,757.00	434,962.50	437,531.50	509,407.50	494,075.50

¹ No licenses required for Wind Cave, Hot Springs, Platt, Hawaii, Lassen Volcanic, Sullys Hill, Rocky Mountain, Mount McKinley, and Acadia National Parks.

² License required only for Giant Forest Road.

NATIONAL PARKS TABLE 13.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during recent fiscal years.¹*

Name of the national park	Appropriations		Revenue received
	Appropriated	Expended	
Acadia (formerly Lafayette):			
1928.....	\$37,940.00	\$37,376.99	-----
1929.....	39,000.00		-----
1929 (deficiency).....	1,355.00	40,014.00	-----
1930.....	52,600.00	48,701.52	-----
1931.....	59,900.00	56,984.42	-----
1932.....	61,600.00		-----
Bryce Canyon:			
1930.....	26,100.00	21,580.01	-----
1931.....	13,700.00	13,700.00	-----
1932.....	20,000.00		-----

¹ For statement of appropriations and revenues prior to 1917 see 1920 Annual Report, pp. 354-358, and for 1918 to 1927 see 1930 Annual Report, pp. 66-72.

NATIONAL PARKS TABLE 13.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during recent fiscal years*¹—Continued

Name of the national park	Appropriations		Revenue received
	Appropriated	Expended	
Carlsbad Caverns National Park:			
1928.....	\$30,000.00	\$28,492.84	\$55,682.00
1929.....	70,000.00	63,490.00	84,983.45
1929 (deficiency).....	260.00		
1930.....	100,000.00	¹ 103,271.01	136,241.78
1931.....	165,600.00	124,220.75	143,779.55
1932.....	150,100.00		
Crater Lake:			
1928.....	63,590.00	62,382.53	22,927.69
1929.....	47,100.00	² 61,464.00	24,318.22
1929 (deficiency).....	850.00		
1930.....	59,800.00	67,938.75	38,023.70
1930 (deficiency).....	12,000.00		
1931.....	73,300.00	² 73,551.96	35,843.15
1932.....	106,900.00		
General Grant:			
1928.....	13,650.00	13,529.26	3,488.90
1929.....	15,650.00	15,802.00	3,305.70
1929 (deficiency).....	500.00		
1930.....	15,650.00	15,448.14	3,868.28
1931.....	15,860.00	15,841.07	3,989.95
1932.....	21,900.00		
Glacier:			
1928.....	163,300.00	162,525.28	14,652.59
1929.....	188,200.00	191,061.00	18,436.18
1929 (deficiency).....	5,065.00		
1930.....	219,400.00	215,726.91	22,146.16
1931.....	227,000.00	223,956.32	17,866.46
1930 (deficiency).....	9,550.00		
1932.....	256,500.00		
Great Smoky Mountains:			
1930-31 (deficiency).....	30,000.00	25,193.31	76.00
1932.....	30,000.00		
Grand Canyon:			
1928.....	128,760.00	128,268.33	46,097.43
1929.....	169,000.00	151,813.00	49,078.33
1929 (deficiency).....	3,540.00		
1930.....	145,000.00	141,389.56	55,684.46
1931.....	153,600.00	² 171,670.11	51,497.05
1932.....	172,200.00		
Grand Teton:			
1929.....			25.00
1930.....			70.00
1931.....	30,700.00	29,048.47	20.00
1932.....	76,750.00		
Hawaii:			
1928.....	18,250.00	18,119.10	1,450.00
1929.....	21,500.00	21,070.00	1,477.00
1929 (deficiency).....	785.00		
1930.....	27,400.00	25,700.05	1,532.52
1931.....	35,800.00	35,439.55	1,500.00
1932.....	54,600.00		
Hot Springs:			
1928.....	69,800.00	67,443.19	47,695.50
1929.....	68,000.00	71,970.00	47,930.90
1929 (deficiency).....	6,320.00		
1930.....	70,900.00	69,173.38	47,931.33
1931.....	218,500.00	194,760.18	50,467.80
1932.....	89,300.00		
Lassen Volcanic:			
1928.....	15,625.00	15,448.52	167.84
1929.....	22,400.00	² 22,688.00	34.36
1929 (deficiency).....	460.00		
1930.....	25,300.00	25,061.16	3,089.55
1931.....	30,500.00	29,007.20	51.59
1932.....	50,300.00		
Mesa Verde:			
1928.....	50,750.00	48,343.59	3,342.80
1929.....	83,000.00	² 78,134.00	4,719.00
1929 (deficiency).....	1,115.00		
1930.....	57,000.00	53,910.66	4,870.62
1931.....	96,800.00	³ 95,799.70	5,411.27
1932.....	57,300.00		

¹ For statement of appropriations and revenues prior to 1917 see 1920 Annual Report, pp. 354-358, and for 1918-1927 see 1930 Annual Report, pp. 66-72.

² Appropriation augmented by transfers from other appropriations under 10 per cent clause.

³ Reappropriated items. See Table 14.

NATIONAL PARKS TABLE 13.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during recent fiscal years*¹—Continued

Name of the national park	Appropriations		Revenue received
	Appropriated	Expended	
Mount Rainier:			
1928.....	\$108,000.00	\$105,447.74	\$32,495.50
1929.....	141,000.00	2 141,285.00	39,233.17
1929 (deficiency).....	3,370.00		
1929-30 (deficiency).....	2,500.00	125,214.00	41,530.31
1930.....	122,600.00		
1931.....	180,900.00	174,823.33	46,034.89
1932.....	195,000.00		
1931-32 (deficiency).....	71,000.00		
Mount McKinley:			
1928.....	22,000.00	21,314.12	63.04
1929.....	35,900.00	2 36,165.00	1.00
1929 (deficiency).....	740.00		
1930.....	40,000.00	37,680.26	213.18
1931.....	46,700.00	42,686.45	292.00
1932.....	31,100.00		
Platt:			
1928.....	13,050.00	12,991.87	77.16
1929.....	18,000.00	19,053.00	33.05
1929 (deficiency).....	1,080.00		
1930.....	16,200.00	16,178.70	
1931.....	18,500.00	18,269.14	
1932.....	35,900.00		
Rocky Mountain:			
1928.....	97,620.00	95,612.07	924.12
1929.....	95,500.00	2 95,230.00	1,537.07
1929 (deficiency).....	2,380.00		
1930.....	96,000.00	94,871.34	4,471.24
1931.....	105,950.00	104,880.57	448.45
1932.....	118,800.00		
Sequoia:			
1928.....	109,000.00	108,863.10	35,105.83
1929.....	113,000.00	2 114,626.00	30,753.00
1929 (deficiency).....	3,440.00		
1930.....	130,000.00	130,056.49	33,934.54
1931.....	113,100.00	111,513.95	35,694.49
1932.....	156,900.00		
Wind Cave:			
1928.....	10,850.00	11,500.00	12,725.50
1929.....	11,000.00	11,744.00	13,178.17
1929 (deficiency).....	760.00		
1930.....	13,500.00	13,442.51	16,715.01
1931.....	54,900.00	46,271.94	11,968.43
1932.....	25,200.00		
1931-32 (deficiency).....	50,000.00		
Yellowstone:			
1928.....	400,000.00	2 399,150.00	251,663.11
1929.....	434,000.00	2 443,230.00	289,388.95
1929 (deficiency).....	12,230.00		
1930.....	453,000.00	463,306.47	317,238.17
1930 (deficiency).....	17,000.00		
1931.....	501,275.00	500,026.39	259,723.33
1932.....	560,800.00		
Yosemite:			
1928.....	301,000.00	3 257,363.73	276,438.20
1928 (deficiency).....	15,000.00		
1929.....	387,250.00	2 449,159.00	237,166.90
1929 (deficiency).....	14,385.00		
1930.....	412,360.00	3 390,204.38	280,355.45
1930 (deficiency).....	5,381.00		
1931.....	510,100.00	574,302.64	260,805.28
1931 (deficiency).....	32,500.00		
1932.....	558,600.00		
Zion:			
1928.....	30,900.00	30,737.69	3,106.50
1929.....	38,000.00	40,569.00	3,576.50
1929 (deficiency).....	3,295.00		
1930.....	38,300.00	2 42,290.11	7,724.01
1931.....	33,200.00	2 32,589.60	15,500.50
1932.....	54,100.00		
George Washington B. P. Natl., Mon.:			
1930 (deficiency).....	996.18	987.71	
1930-31 (deficiency).....	80,000.00	78,782.34	
1931.....	2,500.00		
1932.....	26,500.00		

¹ For statement of appropriations and revenues prior to 1917 see 1920 Annual Report, pp. 354-358, and for 1918-1927 see 1930 Annual Report, pp. 66-72.

² Appropriation augmented by transfers from other appropriations under 10 per cent clause.

³ Reappropriated items. See Table 14.

NATIONAL PARKS TABLE 13.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during recent fiscal years*¹—Continued

Name of the national park	Appropriations		Revenue received
	Appropriated	Expended	
Colonial National Monument: 1931-32 (deficiency)-----	\$135,000.00		
Protection of National Monuments:			
1928-----	25,000.00	\$24,042.56	\$132.00
1929-----	35,000.00		
1929 (deficiency)-----	1,225.00	35,951.00	97.00
1930-----	46,000.00	³ 42,634.76	100.00
1931-----	83,900.00		
1931 (deficiency)-----	3,000.00	71,598.75	269.60
1932-----	165,400.00		
National Park Service:			
1928-----	57,100.00	57,047.56	20.10
1929-----	70,200.00		
1929 (deficiency)-----	4,660.00	² 75,714.00	
1930-----	80,830.00	81,864.36	0.25
1931-----	117,000.00	115,859.20	
1932-----	167,400.00		
Fighting forest fires:			
1922-----	25,000.00	9,618.30	
1923-----	25,000.00	17,764.16	
1924-----	25,000.00	6,526.02	
1925-----	20,000.00	20,000.00	
General expenses, N. P. S.:			
1931-----	25,000.00	24,993.02	
1932-----	35,100.00		
Emergency reconstruction: 1925-----	20,000.00	17,009.15	
Forest protection and fire prevention:			
1931-----	96,850.00	95,856.95	
1932-----	170,000.00		
Emergency reconstruction and fighting forest fires:			
1926-----	40,000.00		
1926 (deficiency)-----	40,000.00	80,000.00	
1927-----	40,000.00	40,000.00	
1927 (deficiency)-----	235,000.00	228,647.83	
1928-----	40,000.00	26,865.46	
1929 (deficiency)-----	29,000.00	³ 40,138.26	
1930-----	20,000.00		
1930 (deficiency)-----	180,000.00	180,300.17	
1931-----	50,000.00	40,481.49	
1932-----	50,000.00		
Construction of roads and trails:			
1925 (deficiency)-----	1,000,000.00	1,000,000.00	
1926-----	1,500,000.00	1,500,000.00	
1927-----	2,000,000.00	2,000,000.00	
1928-----	2,000,000.00	2,000,000.00	
1928 (deficiency)-----	1,000,000.00	1,000,000.00	
1929-----	2,500,000.00	2,500,000.00	
1930-----	5,000,000.00	5,000,000.00	
1931-----	5,000,000.00		
1931 (deficiency)-----	2,500,000.00	7,500,000.00	
1932-----	5,000,000.00		
Emergency construction, roads and trails: 1931 (deficiency)-----	2,078,800.00	2,078,800.00	
Insect control:			
1925-26 (deficiency)-----	25,000.00	24,945.24	
1927-----	20,000.00	19,828.96	
1928-----	7,500.00	7,379.35	
Southern Appalachian:			
1925-26 (deficiency)-----	20,000.00	12,453.27	
1927-----	⁽³⁾	7,252.21	
1928-----	5,000.00	³ 3,887.13	
1929-----	4,500.00	³ 3,945.07	
1930-----	3,000.00	³ 3,415.75	
1931-----	3,000.00	³ 4,172.45	
Purchase of lands:			
1928-----	50,000.00	13,925.00	
1929-----	50,000.00	1,383.00	
1930-----	250,000.00	17,233.93	
1931-----	1,750,000.00	⁴ 1,983,718.06	
1932-----	1,000,000.00		
Extension of winter-feed facilities:			
1930-----	75,000.00	7,612.50	
1931-----	75,000.00	10,265.00	
Purchase of lands, Colonial National Monument, Va.:			
1931-32 (deficiency)-----	500,000.00		

¹ For statement of appropriations and revenues prior to 1917 see 1920 Annual Report, pp. 354-358, and for 1918-1927 see 1930 Annual Report, pp. 66-72.

² Appropriation augmented by transfers from other appropriations under 10 per cent clause.

³ Reappropriated items. See Table 14.

⁴ Available until expended.

NATIONAL PARKS TABLE 14.—*Statement of amounts reappropriated and made available for expenditure in subsequent fiscal years*

Appropriated for fiscal year	Reap- propri- ated for fiscal year	Park	Amount	Purpose
1928.....	1929	Yosemite.....	35,000.00	Hospital building.
1928.....	1929	Southern Appalachian..	1,112.87	To remain available; general.
1928.....	1929	Emergency reconstruc- tion and fighting forest fires.	13,134.54	Do.
1929.....	1930	Yosemite.....	8,661.78	Construction of water supply and camp- ground facilities.
1929.....	1930	Carlsbad Caverns.....	4,950.00	Superintendent's residence.
1929.....	1930	Southern Appalachian..	1,662.55	To remain available; general.
1929.....	1931	Grand Canyon.....	20,000.00	Hospital building.
1930.....	1931	Acadia.....	2,850.00	Equipment storage building.
1930.....	1931	Crater Lake.....	1,091.06	Ranger station.
1930.....	1931	Mesa Verde.....	1,652.18	2 ranger stations.
1930.....	1931	Yosemite.....	32,662.70	Physical improvements.
1930.....	1931	National monuments....	2,500.00	Employees' quarters (2) at Petrified Forest.
1930.....	1931	Southern Appalachian..	1,246.80	To remain available; general.
1930.....	1931	Glacier.....	9,550.00	One-third of cost of constructing a tele- phone line.

NATIONAL PARKS TABLE 15.—*Statement of amounts transferred under the au-
thority contained in the appropriation acts to transfer 10 per cent from one appro-
priation to another, fiscal year 1931*

Year	Amount	From—	To—
1931.....	\$360	Hawaii National Park.....	Forest protection and fire pre- vention.
1931.....	610	Glacier National Park.....	Yellowstone National Park.
1931.....	1,000	Hot Springs National Park.....	Do.
1931.....	800	Carlsbad Caverns National Park.....	Do.

NATIONAL PARKS TABLE 16.—*Summary of appropriations for the administration,
protection, and improvement of the national parks and national monuments,
together with the revenues received, for the fiscal years 1917¹–1931, inclusive*

Year	Department	Appropriation	Revenues
1917	Interior Department.....	\$537,366.67	
	War Department.....	247,200.00	
		\$784,566.67	\$180,652.30
1918	Interior Department.....	530,680.00	
	War Department.....	217,500.00	
		748,180.00	² 217,330.55
1919	Interior Department.....	963,105.00	
	War Department.....	50,000.00	
		1,013,105.00	196,678.03
1920		907,070.76	316,877.96
1921		1,058,969.16	396,928.27
1922		1,433,220.00	432,964.89
1923		1,446,520.00	513,706.36
1924		1,892,601.00	663,886.32
1925		3,027,657.00	670,920.98
1926		3,258,409.00	826,454.17
1927		3,698,920.00	703,849.60
1928		4,889,685.00	808,255.81
1929		4,754,015.00	849,272.95
1930		7,813,817.18	1,015,740.56
1931		12,113,435.00	940,364.79
1932		12,754,250.00	-----

¹ For summary of appropriations and revenues prior to 1917 see 1920 Annual Report, p. 359.² The revenues from the various national parks were expendable during the years 1904 to 1918, inclusive, with the exception of those received from Crater Lake, Mesa Verde, and Rocky Mountain National Parks, the revenues from which were turned into the Treasury to the credit of miscellaneous receipts.

NATIONAL PARKS TABLE 17.—*Statement of appropriations and authorizations for road and trail work in the national parks and national monuments*

Fiscal year	Appropriation acts	Cash appropriation	Authority to enter into contractual obligations	Total program by fiscal years
1925----	Act Dec. 5, 1924, 43 Stat. 686.....	¹ \$1,000,000	-----	\$1,000,000
1926----	Act Mar. 3, 1925, 43 Stat. 1179.....	1,500,000	² \$1,000,000	2,500,000
1927----	Act May 10, 1926, 44 Stat. 491.....	2,000,000	² 1,500,000	2,500,000
1928----	Act Jan. 12, 1927, 44 Stat. 966.....	2,000,000	² 2,500,000	-----
	First deficiency act, Dec. 22, 1927, 45 Stat. 19.....	1,000,000	-----	3,000,000
1929----	Act Mar. 7, 1928, 45 Stat. 237.....	2,500,000	² 4,000,000	5,000,000
1930----	Act Mar. 4, 1929, 45 Stat. 1601.....	5,000,000	² 2,500,000	3,500,000
1931----	Act May 14, 1930, 46 Stat.....	5,000,000	² 2,500,000	-----
	Act Dec. 20, 1930, emergency construction.....	1,500,000	-----	-----
	Emergency construction funds transferred by the President.....	578,800	-----	7,078,800
1932----	Act Feb. 14, 1931, 46 Stat.....	5,000,000	2,850,000	-----
	Second deficiency act, 1931, Mar. 4, 1931.....	2,500,000	-----	7,850,000
Total appropriated.....				\$29,578,800
Authorization (unappropriated).....				2,850,000
Total program to date.....				32,428,800

¹ Of this amount \$4,290.39 was reappropriated Dec. 22, 1927 (45 Stat. 46) and \$510 on May 29, 1928 (45 Stat. 933).

² Funds appropriated in next fiscal year.

APPENDIX D

REPORTS OF ENGINEERING, LANDSCAPE ARCHITECTURAL, EDUCATIONAL, FORESTRY, SANITATION, FISH-CULTURAL OPERATIONS, AND WILD-LIFE SURVEY DIVISIONS

REPORT OF CIVIL ENGINEERING DIVISION

FRANK A. KITTREDGE, Chief Engineer, San Francisco, Calif.

Engineering effort covered by 1932 fiscal-year funds is embodied in approximately 308 projects amounting to approximately \$10,200,000, of which 44 projects and approximately \$8,400,000 represent major road work handled by the Bureau of Public Roads, and 264 projects and approximately \$1,800,000 represent physical improvements and minor road and trail projects handled by the Park Service.

It is desired that proposed work should have: First, educational review as to location and development of all points of educational interest; second, engineering study as to the safe and economical routing of traffic such as location and construction of roads and trails, location of public buildings which by their nature will affect public travel, sanitary engineering, structural engineering, bridge designing, hydroelectrical engineering, and practically every other branch of engineering; and third, thorough and careful landscape study, review, and suggestions, in order that necessary development may cause the least possible change of natural conditions, and that necessary physical improvements may be so designed as to harmonize with and become a part of the surroundings.

While the routing of traffic is essentially and primarily an engineering problem, and the location and outward design of buildings is in this case a matter for consideration by a landscape architect, we feel that neither problem can be safely considered or plans advanced by architect or engineer alone. In the location of every road and trail there are landscape architectural problems. In the location and structural design of every building there are essential engineering problems.

Where fundamental engineering principles have been observed in the location of public buildings and the location and construction of roads, all to facilitate and simplify the movement of traffic, the beauty of the landscape is brought within the reach of all; while a development where those engineering principles have not been observed may result in such mental confusion that all beauty and harmony of the natural surroundings is nullified.

Increased funds for engineering study and construction have made possible the long-cherished engineering ambition to build not only with economy but for permanence and harmony.

ORGANIZATION

The engineering work is largely coordinated under the chief engineer at field headquarters; except in a few of the parks where there are park engineers, the engineering division at field headquarters, at the request of the various superintendents, is furnishing practically all of the engineering personnel.

The engineering work is, to a large extent, divided into two classes—field work or surveys and construction, and office work or planning and design. Owing to the limited working season in the majority of the parks, it is possible for the field engineers to supervise the various construction activities during the summer months, and spend the winter months at field headquarters preparing plans, estimates, etc., and making detailed studies of the special problems that arise.

During the construction season engineers were assigned to practically all of the parks, also personnel for survey parties. These engineers with their assistants aid the superintendents in carrying out their construction programs and in making surveys and obtaining data for planning proposed work. Efficient and adequate supervision of all construction projects is of the utmost importance to assure their completion within available appropriations and in accordance with plans.

By combining the seasonal activities in this manner it has been possible up to the present time to handle a large volume of planning, drafting, design, and map work, besides construction, with only a very small permanent force.

CONSTRUCTION PROJECTS

The construction jobs and designs which the engineering division is called upon to handle are of two different classes: "Roads and trails" projects, and "Physical improvement" projects. Owing to lack of space, no attempt will be made to enumerate all of the projects initiated during the year, but the lists following will give an idea of the wide variety and great number of problems encountered. They cover nearly the entire field of engineering, and require a wide versatility in engineering education and training, and years of experience and mature judgment to execute properly and economically.

ROADS AND TRAILS PROJECTS

Major roads projects.—There have been allotted to major roads projects the following projects and sums:

Emergency labor relief appropriation, 7 projects-----	\$2, 078, 000
From regular park appropriation, 30 projects-----	4, 822, 000
From approach road appropriation, 7 projects-----	1, 500, 000
Total-----	8, 400, 000

The Bureau of Public Roads, at the request of the National Park Service, is handling the survey and construction of major projects. There are 44 major projects under construction this year as a part of the 1932 fiscal-year appropriation program. These projects are covered by large contracts.

Park handled projects.—There were 264 projects, involving an expenditure of approximately \$1,802,000, handled by park day-labor forces, of which 82 were minor road-and-trail projects amounting to \$762,000, and 182 physical-improvement projects amounting to approximately \$1,040,000.

The following tabulation gives an analysis of the various classes of minor road-and-trail projects:

Type	Number of projects	Total cost	Type	Number of projects	Total cost
Trail construction-----	33	\$245, 000. 00	Subsidiary roads-----	4	\$26, 500. 00
Road oiling and semiprocessing	14	132, 700. 00	Parking areas-----	2	13, 000. 00
Rock parapets-----	2	7, 000. 00	Bridges-----	2	10, 000. 00
Telephone lines-----	4	24, 500. 00	Channel protection-----	1	10, 000. 00
Landscaping—restoration-----	3	12, 000. 00	Miscellaneous-----		25, 000. 00
Roadside clean-up-----	5	25, 000. 00			
Post construction of roads and road betterment-----	12	100, 000. 00	Total-----	82	630, 700. 00

All minor projects are 1-year projects; are covered by cash allotments; and, in most cases, are done by day labor.

PHYSICAL IMPROVEMENT PROJECTS

The physical improvements in the parks and monuments cover all construction activities not included under "Roads and trails" and "Fire protection."

The following tabulation gives an analysis of the various classes of physical improvement projects:

Type	Number	Appropriation	Type	Number	Appropriation
Administration or office buildings.....	3	\$30,800	Landscaping.....	4	\$6,500
Equipment sheds, barns, garages, and gas stations.....	21	26,700	Lighting and wiring.....	3	700
Employees' quarters and ranger stations.....	55	266,600	Museum and information buildings.....	1	1,300
Camp-ground development.....	12	46,400	Power systems and houses.....	6	182,800
Checking stations.....	2	4,000	Water development and reservoirs.....	21	203,100
Comfort stations.....	27	136,500	Revetments and river protection.....	1	8,000
Elevator stations.....	1	25,000	Sewer systems.....	15	120,000
Fences, road camps, and other structures.....	8	10,700	Underground trails.....	1	10,000
First-aid stations.....	1	2,400	Telephone systems.....	3	12,900
Garbage disposal and incinerators.....	3	11,600	Relocation Indian village.....	1	7,000
			Total.....	189	1,113,000

The following are descriptive statements of a few of the more important physical-improvement projects supervised entirely or partly by the engineering division during the past year:

Water-supply system, Craters of the Moon Monument.—Prior to the summer of 1931 there was no water for any use in Craters of the Moon except what was hauled in tanks. To remedy this very undesirable feature, an appropriation of \$18,750 was made. A pipe line approximately 5 miles long was surveyed in August, 1930, and constructed during the season of 1931. Two-inch cast-iron pipe and 2-inch galvanized-iron pipe were used. This job was located and constructed under the supervision of the engineering division.

Deep water well, Mesa Verde Park.—Well-drilling operations began December 22, 1930, by spudding in with an 18-inch bit. The 18-inch hole was drilled for 80 feet and reduced to 12½ inches. As the well now stands, there are 830 feet of 12½-inch casing, 1,220 feet of 10-inch casing, and 3,423 feet of 8¼-inch casing. The drilling was continued to a depth of 3,553 feet, but was stopped at that depth because the \$40,000 appropriation for this work was exhausted.

Several different sources of water were encountered during drilling operations, but none of them is entirely suitable. It is expected that additional funds will be appropriated at the next session of Congress, with which it is contemplated continuing drilling operations next season until all water-bearing sands have been tested, and it is hoped that a satisfactory water supply will be obtained. A limited supply of potable water was obtained at a depth of 830 feet, and this can be utilized if a more satisfactory supply is not obtained below the Dakota sands.

Electric system, Wind Cave National Park.—This interesting cave-lighting project was completed early in the summer. Two hundred and ninety-six lights, ranging from 15 watts to 300 watts in size, and totaling 15,400 watts load, are installed within the cave. In dry sections, standard enameled steel reflectors were used. In wet locations, specially cast brass waterproof fixtures were installed. A few large flood lights and some color lighting were also placed to show to better effect some of the formations.

The lighting circuits of the cave are divided into 11 sections and these are controlled at both ends of each section, requiring lights to be on in only one section at a time.

All lighting has been placed to eliminate direct glare. Indirect lighting effects have been used in the majority of places, and in other instances lights have been installed to illuminate some scenic feature or directed to the foot trail.

The engine is a 25-horsepower Fairbanks Morse semi-Diesel type, with short belt drives to generator and exciter. The generator has a rating of 12 kilowatts output. This small power plant is modern in every respect. Economy was effected in transferring this engine-generator set from Carlsbad Caverns where it was of inadequate capacity for any service there.

Through control of the cave lighting by sections, this power plant is adequate for the service required, although the connected lighting load is several times its rated capacity.

River channel change and revetment, Devils Tower Monument.—The Belle Fourche River, which runs through Devils Tower National Monument, became blocked with ice during the winter of 1929–30, causing it to overflow its banks and change its channel, which endangered the new steel bridge and washed out its approaches.

On August 18, 1930, the engineering division was instructed to construct a channel change and protect the old banks from erosion. Teams and fresnoes were used to excavate the new channel which is 1,800 feet long, the material being moved for 23.7 cents per cubic yard.

Thirty-nine reinforced concrete tetrahedrons of special design were poured in place and connected with cables to deflect the current into the newly-excavated channel. Sections of the old river bank were protected from erosion by brush mats and felled trees.

This type of bank protection has served remarkably well in certain other projects.

River channel change and revetment, Zion Park.—The type of protection structures employed in Zion was entirely different from that used at Devils Tower. While at Devils Tower it was only necessary to protect about one-half mile of river bank and a bridge, at Zion revetments were necessary at many places for a distance of 5 or 6 miles.

Conditions made the use of tetrahedrons inadvisable, yet it was essential that a structure capable of resisting the strong river currents and yet economical in first cost be obtained. Basket dams—medium-sized rock encased and held together by heavy wire mesh—were employed. Both wing dams and dikes were constructed in this manner and have given excellent service.

Approximately 2,000 linear feet of basket dams and 2,500 linear feet of channel change have been constructed to date under the supervision of the engineering division. This method, then practically unheard of, has been amply justified in cost-saving and durability.

Hot-water collection and distribution system, Hot Springs Park.—During the spring of 1930 surveys were made and data gathered on which to base the designs and construction of this system, and a topographic survey was made, map plotted, and other information shown graphically or tabulated.

Study of the data indicated that the problem could best be solved by retaining the existing 380,000-gallon collecting reservoirs, providing pump and storage capacity sufficient to care for one day's flow of the springs, and by rebuilding the entire collecting system. It was decided to install duplicate centrifugal pumps and pipe lines and to minimize power costs by using two storage reservoirs at different levels. One reservoir has storage capacity of 400,000 gallons, and the other 100,000 gallons. Comparative studies of two possible locations determined that the one chosen was the less expensive and more suitable from the landscape architect's standpoint.

The actual design and drawing of the contract plans and specifications called for much study of many special problems. The reservoirs required extra heavy reinforcing and the installation of expansion joints to strengthen them against temperature stresses in addition to the heavy stresses of water pressure. To conserve water and keep the pumps primed, an elaborate automatic-control system was designed. The pipes were insulated very effectively against heat losses; the reservoirs were covered to conserve heat and to conceal them; they were waterproofed.

The contract for the distributing system was let December 15, 1930, to the Wickes Engineering & Construction Co. of Des Moines, Iowa, which started work January 3, 1931. Construction offered a number of extraordinary difficulties. More rock was encountered than anticipated, and since blasting was cut to the minimum and the seams of the rock in one excavation were full of hot water, delay occurred.

The collecting system was built by park forces. All springs were cleaned and insulated from contamination from surface waters. They were connected by an entirely new system of piping to the existing collecting reservoir.

Meters have been installed on all of the lines leading to bathhouses, and it will hereafter be possible to determine the actual amount of water being used by each consumer.

The engineering division prepared all plans and specifications for both contract work and purchase of materials and proposed construction.

Much landscaping, consisting of regrading and reseeding of lawns, was done, and the concrete sidewalk along Central Avenue was rebuilt.

Temperature tests of the water in the storage reservoirs indicated the effectiveness of the pipe insulation, as the water in these reservoirs is only a few degrees cooler than where it leaves the springs.

The entire system should prove to be much more satisfactory than the several old systems which it replaces, both on account of the water now being delivered to the bathhouses at a much higher temperature, and because of the larger storage capacity and lessened probability of a shortage.

Power development at Sunrise Park, Mount Rainier Park.—An allotment of \$71,000 was made for the construction of a power house, the necessary distribution system and the purchase of a 320-horsepower Diesel engine and generator. This power unit will be completed and ready to operate this season. It will generate 175.2 kilowatts of electricity at the altitude of 6,500 feet.

High-lift pumping plant at Sunrise, Mount Rainier Park.—An allotment of \$15,000 was made for the purchase of equipment and construction of a high-lift pumping unit and pipe line to supply the Sunrise area. A plant having a capacity of 100 gallons per minute under a 900-foot head is being built and will be in operation before the end of the season. The pump will be operated by a 40-horsepower electric motor utilizing approximately 34 kilowatts.

Sewage-disposal system, Yosemite Park.—In 1921 the Park Service built a sewer system and a sewage-disposal plant to protect the waters of the Merced River. By 1928 this system had become overloaded and an enlargement was imperative. Surveys were made and plans and estimates prepared in 1929. The construction of the new plant was begun in 1930 and completed in 1931. The capacity of the new plant is ample to care for an average population of 30,000 people. The total allotment was \$148,500. There are 4.03 miles of 20-inch sewer pipe. The sewage-disposal plant is the activated sludge type, and consists of 1,057 cubic yards of reinforced concrete in the tanks alone.

Trestle replacement, Yosemite Park.—The substructure carrying the pipe line to the hydroelectric plant on the Merced River gave a great deal of trouble for several years through failure of sills and bent caps by crushing and shearing. A thorough inspection of this structure was made in May and June, 1930, and an adequate replacement plan was worked out by the engineering division. Bents and footings were redesigned and heavier bracing specified. Forty thousand board feet of redwood timber and 28,000 board feet of Douglas fir were used. The construction work was carried out under the direction of an engineer from field headquarters and the superintendent.

The total length of trestle rebuilt is approximately 1,000 feet. The cost of this work was \$10,672.44.

Passenger elevators, Carlsbad Caverns Park.—A shaft 8 by 16 feet in size and 754 feet long was excavated through solid limestone to permit the installation of two passenger elevators. These will be the largest single-lift passenger elevators in the world, and their use will eliminate the strenuous climb out of the cavern and facilitate the transportation of supplies and material into the cavern.

The survey traverse, establishing the top and the bottom of the shaft, closed within one-quarter of an inch. This was very accurate, considering the unevenness of the line and the total darkness in which the work had to be done.

The excavation of the shaft was carried down from the top and up from the bottom simultaneously. The continuous solid rock encountered the entire distance, honeycombed by thousands of water holes, made drilling and shooting difficult. The waste material from the shaft was used for road surfacing and that from the raise for trail dressing and leveling of the lunch-room floor.

The entire surface of the shaft has been gunited with concrete to prevent weathering and the possibility of falling stones. A special quick-setting cement was used.

The steel struts supporting the elevator guides were set in sitches 9 inches deep in the solid rock walls and concreted in place. All of the inside metal was treated to prevent rust.

The elevator is of the gearless traction type with a speed which is variable to 700 feet per minute. Its capacity is 2,000 pounds, which is equivalent to 12 passengers. All modern safety devices are used. One cage only is being installed at this time, but all provisions have been made for the installation of the second cage. The plans for this installation were prepared in the San Francisco office, and the construction was carried on by contract under the supervision of the engineering division.

Water supply and sanitary sewer, Wind Cave Park.—These two projects were contracted and work carried on under the engineering supervision of field headquarters.

The new water supply system consists of 3 miles of water pipe laid in a trench 5 feet deep, and is made up of 3,500 feet of 2½-inch and 8,500 feet of 2-inch galvanized iron pipe supplying water to the concrete reservoir. From the reservoir to park headquarters 2,350 feet of 4-inch wood stave pipe was laid. Air valves and drains were installed to enable the line to be drained during extreme cold weather, and to insure constant flow when supplying water to the reservoir. The appropriation for this project was \$7,400.

The sewer line consists of three-quarters of a mile of 4-inch vitrified sewer pipe laid between park headquarters and the aeration plant. Provision was made for connections to future buildings as well as to the present buildings. The appropriation for this work was \$5,000.

FIRE PROTECTION

Under this classification are included all projects which are directly connected with protecting the national parks and monuments against the hazard of fire. During the last year expenditures were made on such items as fire lookouts, fire lanes, telephone lines, fire storehouses, fire trucks, etc.

Twenty projects were under construction during the year under an appropriation of \$40,000, as follows:

Project	Number	Appropriation
Lookout stations.....	4	\$16,200
Other fire buildings.....	7	12,675
Telephone lines.....	5	4,375
Fire lanes and trails.....	4	6,750
Total.....	20	40,000

SURVEYS

Surveys preparatory to construction or investigations for construction planning have been necessary in connection with the larger projects. Development and construction surveys were made in 15 of the national parks and monuments.

These surveys have been carried on by the engineer sent from field headquarters and the necessary assistants, usually hired in the parks.

Surveys to obtain topographical maps have been made in 12 national parks and monuments. Two topographic survey parties have been in the field the greater part of the past season, and in addition a number of topographic surveys were made by survey parties engaged on other work as time could be spared from their regular assignments.

During the season topographic surveys were made of 21 separate areas, totaling 7,860 acres.

In an effort to expedite topographic surveys without increasing the personnel, the greater portion are now being made on a scale of 1 inch=100 feet, and only small special areas are made on the former general scale of 1 inch=40 feet. This change in scale has resulted in greatly speeding up the work and making it possible for the same survey crews to cover several times the area possible with the larger scale.

MAPS

Topographic maps.—Tracings have been made of 81 standard-size topographic sheets and the balance will be prepared in the drafting room during the winter.

Road-and-trail maps.—Approximately 194 maps showing the road-and-trail systems of the various national parks and their approach roads have been prepared. These maps indicate by symbols and colors the existing and the proposed roads and trails in all of the national parks in so far as they have been prepared to date. There is still a large amount of this work remaining to be done.

PLANS AND DESIGNS

There have been approximately 95 plans prepared covering general undertakings in a great many of the parks. These plans cover items such as supplementary features for pipe lines, camp-ground development, and mechanical details, etc.

One hundred and twelve separate engineering designs were prepared covering projects in 12 of the parks and monuments. These designs incorporate the results of careful, detailed planning of technical features and computations as to stress and suitability of most of the structures. They cover a great variety of types of work and almost every conceivable form of structure, from the small-est to 500,000-gallon reinforced concrete reservoirs, and a modern passenger elevator and shaft 754 feet deep through solid rock.

Elevator.—The designs and plans for an elevator shaft 754 feet deep and installation of a passenger elevator required 40 drawings and carefully prepared designs for the lining of the shaft walls, the steel framing through possible caverns, the supports for shaft equipment and elevator, the reinforced concrete details for the penthouse, housing and layout of electrical equipment, a special concrete foundation and collar at top of shaft, and innumerable other detailed plans in connection with the project.

Hot-water system.—Design of 400,000 and 100,000 gallon hot-water storage reservoirs, two pump houses, and the reconstruction and remodeling of the entire hot-water system which carries the water from the numerous hot springs to the 19 bathhouses and resorts. Some 41 drawings and designs were required for the two reinforced concrete reservoirs and pump houses, and various pipe, electrical, and other details. Special provision had to be made in the design of the tanks and pipe lines so as to retain the high temperature of the water.

River revetment.—Design for 39 reinforced concrete tetrahedrons for river protection work. It was also necessary to design the "forms" for these tetrahedrons.

Bridges and culverts.—Eight designs requiring 10 drawings were prepared for various bridges and culverts in Lassen, Sequoia, and Yosemite National Parks.

Reservoir.—Design of 200,000-gallon water storage tank. Five drawings showing reinforced concrete and other details.

Cliff stairways.—Design for ramp and stairs along the cliff face at Moro Rock. There were 16 ramps, 13 stairways, 180 steps, 6 platforms, and protection walls.

Miscellaneous.—Designs were also prepared for a steel and concrete ramp at the Pinnacles National Monument, a pipe trestle replacement, a boat dock, an upward extension of dam to increase water storage of a lake, and many other smaller projects.

Structural designs on buildings.—Five structural designs were made for entire buildings. Nine were made for parts of buildings such as lintels, roof slabs, walls, beams, and girders.

ESTIMATES

Estimates were prepared of 66 preliminary sketch plans and 33 final building construction plans submitted by the Landscape Architectural Division; also, eight bills of material were made up, based on final construction plans.

EQUIPMENT PURCHASES

From September 1, 1930, to August 31, 1931, field headquarters has made purchases for 26 parks and monuments upon superintendents' requests. Four hundred and seventy-two transactions amounting to \$348,000, requiring 274 formal contracts and 198 purchases without contract, were involved. There were 64 of these purchases which combined the needs of two or more parks.

For the period January 1, 1931, to June 30, 1931, only, which corresponds to that reported upon last year, there were 392 transactions, or 50 more purchases than for the corresponding period of 1930, with an expenditure of \$310,600, or \$32,600 more than last year.

The more extensive use this year of field headquarters purchasing facilities by the superintendents as a whole is significant.

Prompt payments were made on all purchases, and discounts were taken amounting to \$2,524. The greatest saving to the parks, however, is in instances

where it has been possible to combine the needs of several parks, resulting in greater competition and lower prices. This greater saving is, of course, indeterminate.

The director's circular letters of February 21 and March 10 to all park superintendents, giving them the option of deciding whether purchases of equipment and supplies, regardless of cost limitation, should be made by field headquarters or by the parks locally, has been quite generally taken advantage of by them.

Thirty-four sets of specifications upon which to make purchases direct have been furnished the superintendents at their request. This has been advantageous in that it has permitted good-will purchasing from local dealers to some extent and has enabled the parks to purchase special equipment in a restricted field of bidders which would be difficult to obtain in the broader field of competition in the San Francisco Bay area.

The work of standardizing specifications (by no means complete as yet) is being steadily carried on and at present covers 58 separate specifications.

Through close connection with the area coordinator's office, advance information was obtained of the existence of a large quantity of small tools, surplus to the Navy, which upon inspection were found to be all new and in first-class condition. Field headquarters selected such tools as it was thought would prove serviceable in the national parks. The actual cost in the aggregate was only \$445, while the purchase value of the equipment selected at the best wholesale prices was approximately \$4,400.

Deliveries this year have been very much better than for the last season's purchases, due to a much closer follow-up system from the date of the order to the actual delivery at the park or to the carrier. The delays beyond contract time this year for the greater part have been very small, ranging from two to five days, with few cases serious enough to invite comment. Of course, there were cases where requests to purchase came late, and, although these were rushed, their arrival at the park was late.

DISBURSEMENTS

Disbursements during the fiscal year 1931 amounted to the sum of \$807,812.65. Payments made included purchases of equipment, supplies, and materials for various parks, particularly where the contracts and orders were prepared by this office. Payments were made in practically all cases where the proposals were issued and orders and contracts prepared by field headquarters, so that the transactions were completely handled by the same office from initiation to completion. This was found to be very satisfactory from the standpoints of both the parks and the engineering division, resulting in the minimum of confusion and work to all concerned.

Payments were also made on construction contracts where the work was under the direct supervision of this office, such as the construction of an elevator shaft and installation of elevator at Carlsbad Caverns National Park and installation of the hot-water collecting and distributing system at Hot Springs National Park. Payments on monthly estimates were expedited as much as possible.

Payments under construction contracts of the Bureau of Public Roads are now being made from field headquarters to the extent of approximately \$230,000.

Funds allotted to the engineering, landscape, educational and forestry, and purchase of lands divisions, and all expenditures for Craters of the Moon, Muir Woods, and Pinnacles National Monuments are disbursed from field headquarters, as well as payments mentioned above which are handled for other parks and monuments. During the fiscal year 1931 the disbursements amounted to over \$800,000.

REPORT OF LANDSCAPE ARCHITECTURAL DIVISION

THOMAS C. VINT, Chief Landscape Architect, San Francisco, Calif.

The landscape architectural division acts as professional adviser to the Service on matters of architecture and landscape architecture. The office at San Francisco operates not unlike the usual private professional office with the park superintendents and various engineers as clients.

The aim of the division is to obtain a logical, well-studied development plan for each park, which includes determination of the appropriate type of archi-

ture. Within such a development plan, a general plan of each tourist center or community makes a problem of its own. While the division administers no construction funds or assumes no direct charge of any construction, it is concerned with every phase of park development. The protection of the landscape, location, of buildings, bridges and grading work; the selection of types of architecture, and the restoration of natural planting which has been destroyed are problems which must be fitted into the general development plan.

The division prepares the landscape and architectural plans for the Government facilities constructed by the park superintendents' organizations. It reviews the plans submitted by the park operators for the tourists' accommodations. It reviews the plans for road projects and prepares the architectural plans for bridges constructed by the Bureau of Public Roads.

The year being reported was by far the busiest the division has yet seen. To a Government building program, more ambitious than yet attempted, were added the additional activities attending an unusually large road program through the Bureau of Public Roads of nearly \$9,000,000. The latter included an emergency employment program, arising out of the \$1,500,000 appropriated by Congress December 22, 1930, augmented later by a special allotment exceeding \$500,000.

Spring came six weeks early in most parks, and we were not always able to supply plans and specifications as soon as the superintendents would have liked. Preference was naturally given the northern parks with short construction seasons, and the only incomplete plans at the end of the year were in the parks having an all-year construction climate.

A development of unusual interest during the year was the establishment of an Eastern branch of this office. One man was sent East in October as the nucleus of an organization which has since grown to four men. The office is at Yorktown, Va., and from there the landscape problems of the following parks and monuments are handled: Acadia, Great Smoky Mountains, and Hot Springs National Parks, the proposed Shenandoah park area, and the George Washington Birthplace and Colonial National Monuments. Much of their work consists of the restoration of historic buildings to a state as nearly as possible like the original.

A larger number of men were in the field this season than ever before, and projects were more frequently inspected than has been possible heretofore.

PERSONNEL

During the year three positions were reallocated to higher grades and four new junior positions authorized. We now have authority for 1 landscape architect, 1 associate, 6 assistants, and 6 juniors in the San Francisco office, and 3 assistants and 1 junior in the Yorktown office. As the year closes 4 junior positions are being filled temporarily, pending the establishment of a register from the Civil Service examination which closed May 6. Three of the temporary juniors, all doing very satisfactory work, must be replaced from the register as they were deemed ineligible by the Civil Service Commission.

During the year it was decided to start all future positions in the junior grade, and promote as individual work and the occurrence of higher positions may warrant. As the year closes, the personnel problem is more satisfactory than it has been for several years, and, as a result of the examination held for us, it is expected that all positions will be filled with permanent appointees by November 1.

OFFICE WORK

This work constitutes the preparation of plans and specifications for the current year's construction program. It is mainly a drafting-room job. Field men are brought into the San Francisco office when not required in the parks. This procedure has continued to be very satisfactory as the men are familiar with the purpose of all features of a plan when they follow it through its preparation and are thus well prepared to carry out its intent in the field.

While in the office the men not only prepare plans, but review the plans prepared by others. Office work falls into two general classes: The first includes the items within the regular park appropriation and the construction performed by public utility operators or the work done by the superintendents' organizations; the other class constitutes road work carried out through the Bureau of Public Roads under the roads-and-trails appropriation.

During the year just starting much time and study in the office will be devoted to the beginning of a 6-year development plan. This program is a result of the employment stabilization act of 1931. The plan will give a general picture of the park, showing roads and trails, communication facilities, wilderness areas, developed areas, communities, etc. This plan, originated as a guide to development, will naturally be in a constant state of revision and will be brought up to date annually and made a matter of record. The plan will be the work of the park superintendents and the chief landscape architect, chief civil engineer, and the sanitary engineer. The construction estimates for 1933 will constitute the first year of the 6-year program.

Building plans and specifications constitute the major part of our drafting-room work.

Although the year did not see the beginning of the construction of any remarkably large buildings, very interesting administration buildings were commenced in the Southwestern Monuments at Casa Grande and Petrified Forest, together with residences, comfort stations, and utility buildings. These monuments in the Southwest have afforded our first opportunity to develop parks completely—that is, from the standpoint of community planning as well as the detailed plans of the individual buildings themselves.

The year's building plans included many residences, comfort stations, fire lookout towers, shelter cabins, and utility buildings of all kinds. More complete working drawings were prepared than formerly, and we feel that the standard of park buildings has been raised considerably.

An unprecedented number of bridges were designed in conjunction with the Bureau of Public Roads. Several concrete bridges built this year were stained to harmonize with the predominant color of the surrounding landscape. This was a new step for us, and the experiment is proving quite satisfactory.

This year marked the establishment of our goal of preparing sketches to accompany park superintendents' 1933 estimates. This procedure is sure to reflect favorably in obtaining allotments sufficiently large to obviate the practice of cutting plans down to fit the funds.

Office filing systems were simplified considerably and a new numbering system was adopted, as suggested by Assistant Director Wirth after his visit in May.

PARK OPERATORS' CONSTRUCTION PROGRAM

Reflecting the general uncertainty of business, the operators' program was devoid of many large new projects during the year, but numerous additions and improvements were projected. The largest undertaking of the year was the building of a lodge service building in the Sunrise area by the Rainier National Park Co. Plans were drawn up and areas selected for additional cabins by both the Rainier and Glacier Park companies.

A very interesting tourist service and observation building at Desert View, South Rim of the Grand Canyon, is being planned by the Fred Harvey Co.

An increasing demand for housekeeping-cabin facilities was noticeable during the year. The standard of such cabins is being gradually raised.

From a landscape viewpoint, a most desirable and encouraging development is the way in which operators are being won to the desirability of a well-thought-out plan for cabin camps, even though they are but partially built in one season, rather than starting a camp and later adding to it wherever they can find room. Another good sign is the way in which the operators are being converted to the additional and justifiable expense of underground wiring. This is going to overcome the "spider web" appearance of the cabin camps in the future.

BUREAU OF PUBLIC ROADS

Our work with the bureau has gone smoothly throughout the year. The centralizing of bridge plans at the bureau's regional office enables us to confer frequently on points which come up about bridge plans and specifications. Not only are we now furnishing architectural sheets of bridge plans, but our sheets on parking areas, sidewalks, and curbs are being incorporated into their plans.

Many of the engineers are now becoming justifiably proud of results being attained with our type "B" excavation.

During the year specifications were further revised and standardized covering such points as rounding and flattening of slopes, removal of form marks, and methods of blasting less injurious to the surroundings. Quarries, borrow

pits, and abandoned contractors' camps were left in better condition than formerly, as a result of inspections and recommendations by our field men.

In some cases sod was removed from road right of ways and transplanted where needed. Duff is now being saved and applied on finished fill slopes. Our efforts toward protection of roadside and natural landscape also are showing encouraging results.

TRAVEL AND FIELD WORK

The summer construction season, May to November, marks the period of our field work.

Assistant and junior landscape architects are assigned to a park or several adjacent parks for the season. Having men assigned to cover a district enables the work to progress without the delay to construction forces which would arise were they not on hand to interpret plans and make decisions from time to time.

We have found it impossible to make a good national-park man in less than a year of service. Hence, we do not assign the landscape men to a field territory until they have been in the office at least a season.

During the year park superintendents requested more time of our men than we were able to give. The demand for our services is growing and the time is near when each park of any size will need the full time of one landscape man.

This year's field assignments were one man to each, as follows:

1. Rainier and Glacier.
2. Yellowstone, Grand Teton, Craters of the Moon, with a junior handling Rocky Mountain, Wind Cave, and Devils Tower in conjunction with the assistant regularly assigned to these areas.
3. Carlsbad, Platt, Mesa Verde, and the southwestern monuments.
4. Bryce, Zion, and Grand Canyon.
5. Crater Lake, Lassen Volcanic, Sequoia, General Grant, Muir Woods, and the Pinnacles.
6. Yosemite.
7. Colonial, Wakefield, Acadia, Great Smoky Mountains, Shenandoah, and Hot Springs.

It was necessary this season to assign a junior to Yosemite and Sequoia Parks to assist the regular field men in the preparation of plans.

This year I was able to visit several times most of the parks having an active construction program. In conjunction with a trip to Washington in the winter, I visited the Wakefield and Colonial Monuments, and Shenandoah area, and Hot Springs and Carlsbad on my way West. I feel that our work in the field has been most successful. Besides covering the well-established parks, road and building programs were started in heretofore neglected parks and monuments.

LANDSCAPE PROJECTS

Following is a list of drawings and road projects under study by the landscape division at field headquarters:

BRYCE CANYON

Drawings.—Dormitory building, mess house, employee's quarters, general plan.

Road projects.—Rim Road, 1-A (grading and surfacing).

CARLSBAD

Drawings.—Bunk and mess house, machine shop, 2-room cabins, elevator entrance building, alterations to old power house.

CRATER LAKE

Drawings.—Employee's quarters, addition to utility unit at Government Camp, house over gas pump, watchman peak fire lookout tower, storeroom and garage at headquarters' parking area at the lodge.

Roads.—East Entrance Road, 5-A-1 (oiling), Rim Road, 7-A (grading), Diamond Lake Road, 8, and North Boundary Diamond Lake Road, 46-A.

AZTEC RUINS

Drawings.—Comfort station, custodian's quarters, tool and implement shed, general plan.

CASA GRANDE

Drawings.—Administration building, comfort station, superintendent's residence, employee's residence, tool and implement shop, shelter for ruins, housing-unit plan, entrance gateway.

PETRIFIED FOREST

Drawings.—Administration building, custodian's residence, two employees' residences, tool and implement shop, six parking areas, Rio Puerco Bridge, Dry Creek Bridge, headquarters' area plan.

Roads.—Project 1 (grading) and bridges.

CRATERS OF THE MOON

Drawings.—Custodian's residence.

DEVILS TOWER

Drawings.—Custodian's residence.

PINNACLES

Drawings.—Comfort station.

MUIR WOODS

Drawings.—Garage.

DINOSAUR

Drawings.—General plan, custodian's residence, ranger's residence, comfort station, equipment building, administration building, warehouse and stone wall, museum building.

GENERAL GRANT

Drawings.—Comfort station.

Road.—Project 1 (grading).

GLACIER

Drawings.—Double comfort station; shelter cabin; Logan Pass comfort station; road-maintenance camp; snowshoe cabin; woodshed, barn, and rangers' station; powder house; fire lookout; Babb-Piegan customhouse; hose-drying tower; hose house; fire cache and garage; Baring Creek Bridge; parking area at Sun Camp; property-ownership map of Lake McDonald.

Roads.—Transmountain Highway, 1-D, E-1 (clearing), 1-D-2 (grading), 1-D Baring Creek Bridge, Babb-Many Glaciers 3-A-1, B-1 (clearing, grading, surfacing, bridges).

GRAND CANYON

Drawings.—Superintendent's residence, two employees' quarters, Westside Museum, barn and equipment shed, bunk house and mess house, oil and gas house, comfort station, laborers' cabins, community building.

Roads.—Grand Canyon-Desert View, project 1, Old Trails Highway, 2-D-1 (improvement), 2-A-2, B-2, C-2 (surfacing), Bright Angel Springs-North Entrance, 4 (surfacing), Cameron-Desert View, 10 (review of survey).

HAWAII

Drawings.—United States commissioner's residence, administration building, two employees' quarters.

LASSEN VOLCANIC

Drawings.—Employee's quarters, equipment shed, barn, Raker Memorial gateway.

Roads.—Loop Route-Northwest Entrance, project 1 (oiling and surfacing), north approach road connection, 6 (grading).

MESA VERDE

Roads.—North and South Highway, 1-A, B, C, and D (surfacing).

MOUNT MCKINLEY

Drawings.—Three shelter cabins, gas and oil house, comfort station, garage and machine shop.

MOUNT RAINIER

Drawings.—Memorial arch, employee's quarters, comfort stations (Yakima Park, Longmire, and Tahoma Vista), Sunrise Lodge, power house at Sunrise, gas and oil station, parking areas at North Puyallup and Reflection Lakes, St. Andrews Bridge, general plan of Tipsoo Lake area, layout of open-air garage, Paradise, Yakima Park entrance and general plan.

Roads.—White River Highway, project 3 (clearing, grading and surfacing, and bridge), Westside Highway, project 2 (grading and surfacing and bridges), Stevens Canyon, 4-A (grading).

ROCKY MOUNTAIN

Drawings.—Shelter cabins, Timber Creek; mess house, equipment shed, woodshed, and garage; employee's quarters, ranger station, blacksmith shop, Shadow Mountain fire lookout tower, plan at administration area.

Road projects.—Fall River, west side, 1-C (grading).

SEQUOIA

Drawings.—Ash Mountain employee's quarters, comfort station at Giant Forest, ranger station, addition to superintendent's residence, Lodge Pole Camp bridge.

Roads.—General's Highway, 1-B (grading and surfacing), 1-A-2 (grading), 1-E (inspection of survey).

WIND CAVE

Drawings.—Mess house, dormitory, power house, employee's quarters, superintendent's garage.

Roads.—Grading and surfacing, 1-A.

YELLOWSTONE

Drawings.—Snowshoe cabin, mess house, bunk house, comfort station, Tower Falls Bridge, Seven Mile Gardiner River Bridge, six bridges on Red Lodge-Cooke City approach road, addition to Lake ranger station, checking station North Entrance, Pilgrim Creek Bridge.

Roads.—Grand Loop, project 1, East Gate-Lake Junction, project 5-A, B, C (oil processing), Red Lodge-Cooke City approach road, Moran South Boundary approach road.

YOSEMITE

Drawings.—Hospital, garage, comfort stations at Tuolumne Meadows, Indian Village, and Mariposa Grove, garage at Indian Village, Tiltit Trail Bridge; Indian Village cabins, South Fork Merced Bridge; parking area at Wawona Tunnel; El Capitan Bridge; Stoneman Bridge; addition to girls' dormitory; apartment house, Glacier Point ranger cabin, doctor's residence, dentist's residence.

Roads.—Wawona Road, project 2-A-5 (clearing, grading, and tunneling); South Fork Merced Bridge, project 2-B-2; Crane Flat-Mather Road (inspection of survey).

ZION

Drawings.—Wood shed and garage, parking area at Temple of Sinawava, Cable Creek Bridge, employee's quarters, comfort station.

Roads.—Floor of Valley, 2-A and 4-A (grading and surfacing), Virgin River Bridge, 1-A-1.

PARKS GENERAL

Drawings.—Merit insignia, ranger badge, employee's badge, typical sections for flattening and rounding of slopes, license plates for operators' cars, revision of fire lookout towers, fireguard badge, letterhead design.

REPORT OF FIELD HEADQUARTERS BRANCH OF EDUCATION

ANSEL F. HALL, Senior Park Naturalist, Berkeley, Calif.

NEW FIELD HEADQUARTERS AT BERKELEY, CALIF.

Through the cooperation of the University of California space is provided for the field headquarters of the branch of education at Hilgard Hall, Berkeley, Calif. Until recently these quarters were greatly crowded and activities were severely limited. During the past year, however, with the completion of new buildings, the university has very generously made nine rooms available so that at the present time we are adequately provided with offices, library space, photographic laboratories, and laboratories for the preparation of museum exhibits.

The photographic laboratories are exceptional in their convenient layout, and their new location in Hilgard Hall greatly adds to the efficiency of the photographer's work.

MUSEUM DEVELOPMENT

Field Naturalist Carl P. Russell devoted practically his entire time to museum problems, his principal assignment being to problems connected with the establishment of museums in Yellowstone National Park. Senior Park Naturalist Ansel F. Hall also devoted a large portion of his time to museum problems, concentrating upon the Yavapai station and branch museum at Grand Canyon National Park. Other minor museum problems were handled in Yosemite, Crater Lake, Sequoia, and Rocky Mountain National Parks.

Museum development in Yellowstone.—Throughout the entire year Field Naturalist Carl P. Russell was engaged in the planning and installation of museum exhibits for Yellowstone National Park. In 1930 four museums had been erected in Yellowstone Park under the direction of the committee on outdoor education of the American Association of Museums. By September, 1930, these institutions were all functioning, but numerous details in each museum fell short of completion. During September, October, and November consideration was given to general unfinished work, to the new Fishing Bridge Museum project, and to the need of additional exhibit material in the departments of history and ethnology. Trips were made in search of Montana collectors possessing significant items, and this prospecting resulted in the locating of a number of desirable collections. A gift of \$800 from Senator F. C. Walcott and Mr. George Pratt enabled the Yellowstone museums to purchase a part of the W. H. Everman collection in Bozeman, Mont.

During the spring of 1931 Field Naturalist Russell undertook completion of the installation plan for the Obsidian Cliff exhibit and the Fishing Bridge Museum. Research, writing label copy, and supervision of technical work in preparing exhibits have occupied his time to date. A staff of seven workers was employed on the Fishing Bridge project.

Dr. H. C. Bumpus, of the American Association of Museums, in charge of the Yellowstone educational program, arrived in Yellowstone Park on June 22 and until July gave his personal attention to the direction of museum work. Final plans for the Fishing Bridge exhibits were formulated with his assistance. He gave careful consideration to existing exhibits in all Yellowstone museums and directed certain changes which will be made when time is available for the completion of numerous unfinished projects.

August 1, 1931, finds the central bird room of the Fishing Bridge Museum open to the public. A number of cases are unfinished but will be in readiness by September 1. The geology room will be opened to visitors about August 15. The Lake biology room will be completed in time for the opening of the 1932 travel season.

During the spring of 1931 an interesting new museum project was carried out under the direction of Senior Park Naturalist Ansel F. Hall. This was the excavation and preparation for exhibit in place of a section of one of the fossil forests near Camp Roosevelt. The project was financed privately and the work carried out by a group of 11 Eagle Scouts working under the leadership of Dr. Harvey E. Stork, formerly a member of the educational staff in Yellowstone National Park and later field assistant to the senior park naturalist. Technical supervision of this important project was furnished by the Milwaukee Public Museum. Dr. W. A. Barrett, director of the museum; Dr. Ira Edwards, curator of geology; and E. R. Nelson, jr., assist-

ant curator of geology, contributed their personal services during the entire project. Some remarkably interesting discoveries were made, including one root approximately 20 feet in length and also unmodified or only partially modified wood preserved within a casing of silica. A technical report on this project is being prepared by Dr. Ira Edwards, who is also drafting a popular bulletin on the fossil forests of the Yellowstone. This latter publication will be offered as a contribution to the National Park Service.

Grand Canyon National Park.—During the summer of 1930 Senior Park Naturalist Ansel F. Hall concentrated upon the problem of planning and installing equipment and exhibits in the Yavapai station at the South Rim of Grand Canyon, in cooperation with Dr. John C. Merriam and the Grand Canyon Committee of the National Academy of Sciences. The following paragraphs briefly outline this development:

The north side of the building is entirely open to the canyon. From a 60-foot parapet visitors view 15 carefully selected points, each of which has great significance in the general story of the history of the earth and development of life in this region. Binocular telescopes and field glasses are adjusted in fixed positions to indicate the essential features.

The statement of the scientific story told at the Yavapai station has entailed a great deal of careful study on the part of Dr. John C. Merriam, assisted by Dr. W. W. Atwood, Dr. Fred Wright, Dr. David White, and other prominent geologists. After the preliminary statement was carefully drafted on key labels, the materials were brought together by Doctor Merriam in the form of a 20-page publication, "Guide to Parapet Views of Yavapai Station," Grand Canyon.

After the installation of telescopes and field glasses at the Yavapai parapet difficulty was experienced in maintaining these in fixed positions. This was overcome by constructing a parapet at the rim near the station and mounting two movable telescopes through which visitors could view other points of interest not shown from the parapet.

During the previous year a "geological column" had been constructed at the rear of the porch facing the parapet. This column is made up of rocks brought from the Grand Canyon and arranged in order of their actual occurrence, the dimensions of the rocks corresponding with the relative thicknesses of the strata. A similar "fossil column" was constructed during the summer of 1930 and cross-referenced to the geological column. On this fossil column is represented the development of life from the earliest known plants in the Algonkian up to 4-footed animals in the Coconino sandstone.

From the parapet are pointed out the locations of fossil footprints within the Grand Canyon, in the Supai formations, in the Hermit shale, and in the Coconino sandstone. These can easily be reached from the Yaki trail, and spur trails were constructed by the National Park Service so that each important locality can conveniently be visited. At the suggestion of Dr. John C. Merriam, the scout-naturalists who were on duty at Grand Canyon during the summer of 1930 organized an expedition and spent a week hunting similar fossil footprints in the region just below Yavapai Point. A number of important discoveries were made, but the footprints found can not be shown by telescope direct on account of being located at the base of the cliff, immediately under the station.

In the interior exhibit room at the Yavapai station 17 mahogany exhibit cases were installed. These were oriented to correspond with the similar parapet views and were so arranged as to repeat the story in greater detail. This was accomplished by means of transparencies showing significant features in even greater detail than they could be seen through the telescopes. In connection with the transparencies is a series of supporting exhibits brought from the exact points shown in the photographs. Also there are four translucent charts which indicate respectively the geological formations, the fossils found within the Grand Canyon, the effect of geological separation due to the Grand Canyon, and life zones as influenced by the Grand Canyon. There are also installed in the interior exhibit rooms two automatic Balopticons in which are shown lantern slides pertaining to the geology and the life zones of the region. A motion picture has been prepared which demonstrates the great power of the Colorado River.

In the area surrounding the Yavapai station an extensive garden of native plants has been established. Plants from the Canadian Zone at the North Rim and from the Lower Sonoran Zone within the canyon have been established in specially defined plots, and the remainder of the area has been landscaped with

plants from the Upper Sonoran Zone which is the natural habitat here at the South Rim. The establishment of the natural garden surrounding Yavapai station was a contribution of the 1930 scout-naturalist expedition which served in Grand Canyon during the summer of 1930. Subsequently many additional plants have been added by members of the Grand Canyon educational staff.

During the summer of 1930 an expedition from the Gila Pueblo Museum at Globe, Ariz., under the direction of Dr. Harold S. Gladwin, excavated a large pueblo ruin a short distance from the rim, near Lipan Point. A portion of the quadrangle was left untouched while certain rooms were thoroughly cleaned and prepared for exhibit. Mrs. Winifred MacCurdy contributed \$5,000 for the construction of a museum near this point. Plans are being drawn by the landscape architectural division, and the building will be erected by the National Park Service.

Besides the activities briefly listed above, the Gila Pueblo Museum expedition was engaged during the summer of 1930 in very extensive exploration to determine former Indian cultures throughout the Southwest. This was accomplished by means of identification of pottery fragments collected at ancient dwelling sites. Assistance in this project was rendered by the scout-naturalist expedition working in Grand Canyon National Park in 1930. Under the direction of their leader, these lads thoroughly explored an area of 27 square miles, extending from El Tovar to Grand View and from the rim of the canyon south to the boundary of the park. The necessary scientific records were made and the data turned over to Doctor Gladwin for incorporation in the official exploration reports.

Museum development in Yosemite National Park.—The outstanding new museum development in Yosemite National Park was the completion of the Mariposa Grove branch museum. This building is an exact replica of the picturesque log cabin which has occupied the same site for the past 50 or more years. Under the direction of the National Park Service Landscape Division the building was faithfully reproduced, the only change being the elimination of a portion of the central partition to provide for more ample exhibit space. Senior Park Naturalist Hall spent several days in Yosemite National Park early in the season of 1931, working out with Park Naturalist Harwell and Assistant Park Naturalist Presnall the details of a plan of installation. The material exhibited will be limited to that having a bearing upon the story of the giant sequoia. Relief models of the State of California, upon which the distribution of the giant sequoia and coast redwood can be shown, were prepared at Berkeley headquarters and shipped to Yosemite, where the details were completed by the park educational staff. Also Photographer George A. Grant spent considerable time in Yosemite making negatives necessary for the carefully planned exhibit panels. These panels were started by Assistant Park Naturalist Presnall, but the greater part of the work will have to be completed at the end of the 1931 summer season, due to the urgency of current educational activities.

In the main Yosemite museum the arrangement of two rooms was carefully restudied in cooperation with the park naturalist and assistant park naturalist. A plan was outlined whereby the Mather room, which has heretofore been kept locked and used only for historical research, could be made available for museum use. By providing locked glass doors for the bookcases, all rare publications will be protected and exhibit cases will be provided so that exceedingly interesting old hotel registers, historical photographs, and other similar material can be exhibited. These exhibits will be changed from time to time.

The arrangement of the geological room at the Yosemite Museum was restudied and certain changes effected which will greatly aid in the matter of circulation of visitors. Small cases were designed so that transparencies can be exhibited, and a series of three transparencies which were furnished by Doctor Merriam were colored in preparation for their installation in connection with the metamorphic rocks of the region.

Museum development at Crater Lake National Park.—Up to the present time Crater Lake has been without a museum. During the past year, however, considerable time was devoted to assisting the landscape division in planning the Sinnott Memorial lookout and museum which was to be built under congressional appropriation at Victor Rock, just below the rim of Crater Lake. The building was constructed during the summer and fall of 1930 and completed in the spring of 1931. The planning and installation of exhibits, which are being carried out by the senior park naturalist in cooperation with Dr.

John C. Merriam and a special committee appointed by the National Academy of Sciences, will be completed during the coming fiscal year.

During the past year Senior Park Naturalist Hall and Fire-Control Expert Coffman assisted the landscape architectural division in the development of plans for a combined forest fire lookout and educational observation station at the summit of the Watchman at the west rim of Crater Lake. This will be an attractive stone building and is so accessible that thousands of visitors will be entertained there. The building will be erected during the summer of 1931 and will be ready for the installation of exhibits during the season of 1932.

Miscellaneous museum development.—In certain other national parks and monuments the members of the field educational headquarters staff rendered assistance in museum problems. Field Naturalist Carl P. Russell conferred with Superintendent Rogers of Rocky Mountain National Park concerning the lay-out and exhibits for the new museum being erected at Estes Park.

Senior Park Naturalist Hall visited Sequoia National Park and spent some little time with Park Naturalist Been discussing the possible development of the Giant Forest museum. At the present time this museum is inadequately housed and is suffering from the lack of adequate space and attention.

The new museum displays developed at Many Glacier and at Lake McDonald by Park Naturalist Ruhle of Glacier National Park proved to be immensely popular during the season of 1931. These temporary displays are performing an important function in the park and their permanent development should be carefully planned.

Senior Park Naturalist Hall met with Supt. Frank Pinkley of the southwestern national monuments at Casa Grande during the summer of 1930 and in a preliminary way discussed the development of museums in the southwestern monuments. On account of the importance of the Grand Canyon project, however, no additional time could be devoted to the monument problems. With the appointment of Park Naturalist Rose, the educational activities in the southwestern monuments are facing certain successful development, and it is recommended that the entire problem of museums in the Southwest be carefully studied.

In Muir Woods National Monument assistance was rendered by the staff of field educational headquarters in the establishment and labeling of a nature trail. Metal labels were prepared through the cooperation of scout naturalists of past seasons and contributed to the National Park Service. Also arrangements were made by Senior Park Naturalist Hall for Custodian Herschler to meet Mr. John Rothschild, of San Francisco, who has very generously offered to finance the reestablishment of the native flora of Muir Woods. Species such as the azalea, the dogwood, and other flowering plants which have been almost exterminated in the past, will be reestablished under the direction of the landscape division and branch of Education.

PHOTOGRAPHIC DEPARTMENT

The photographic department was established in 1929 and operated for one year on funds contributed from outside sources. During the past fiscal year the department has been operated under regular National Park Service appropriation.

Photographer George A. Grant spent the summer season of 1930 in field work at Grand Canyon, Rocky Mountain, Grand Teton, and Yellowstone National Parks. During the early part of the 1931 season field work was continued in Yosemite National Park and Craters of the Moon National Monument.

During the winter of 1930-31 new laboratories were made available in connection with the enlarged headquarters at the University of California. This has greatly increased the efficiency of the work of the photographic department. During the winter approximately 12,000 prints and 2,500 lantern slides were made from about 1,000 negatives from Grand Canyon, Rocky Mountain, Grand Teton, and Yosemite National Parks and the Southwestern National Monuments. Many of the slides were colored for individual parks by Miss Florence E. Taylor, working on a contract basis at Berkeley headquarters.

Thus far printing has been completed on the negatives from Grand Canyon, southwestern monuments, Mesa Verde, Zion, Bryce Canyon, Grand Teton, and Rocky Mountain National Parks. Complete sets of prints, with numerous duplicates, were furnished to the Washington office, and it is now possible to order prints and slides of the above park photographs by number. Negatives are

available for Sequoia, Yosemite, Lassen Volcanic, Crater Lake, and Mount Rainier National Parks, but the making of prints will require several months' additional work.

Photographer George A. Grant was transferred from field headquarters at Berkeley to the Washington office of the National Park Service, effective July 1, 1931.

NATURE TRAILS

During the past fiscal year cooperation has been extended to a number of national parks in the matter of establishing nature trails. Several hundred metal labels have been prepared on the Roover stamping press for Grand Canyon, Mesa Verde, Rocky Mountain, Yellowstone, Glacier, and other national parks.

STATISTICAL ANALYSIS OF THE DEVELOPMENT OF THE EDUCATIONAL DIVISION

During the past year Senior Park Naturalist Ansel F. Hall completed a statistical analysis which presents in tabular form an accurate record of the development of the educational activities in all of the national parks during the past 11 years. This work, completed in February, 1931, will be kept up to date.

Summary of current educational activities in the national parks for the year ended September 30, 1931

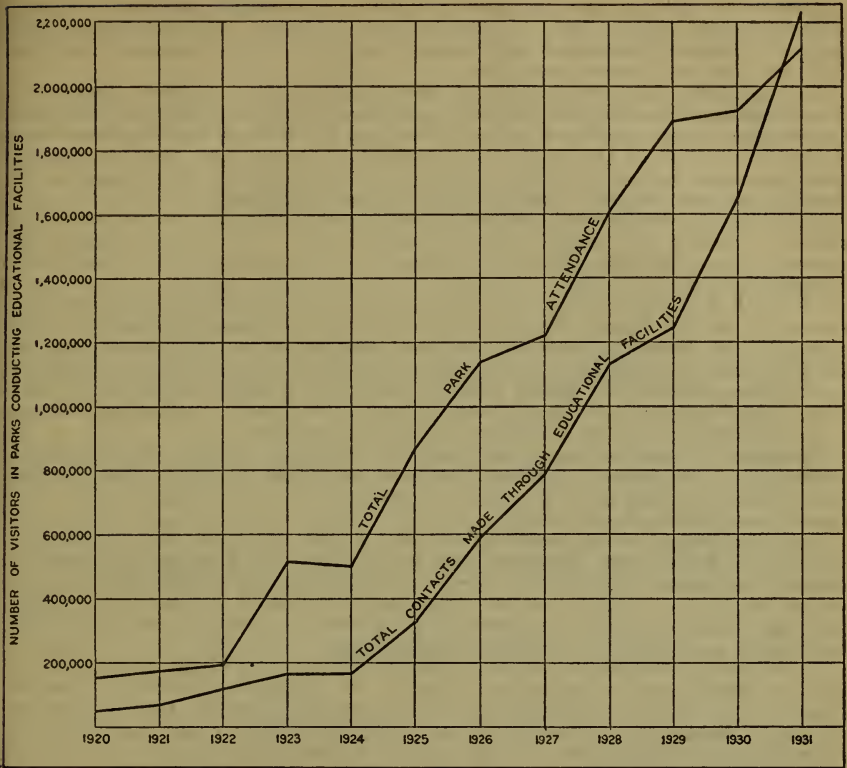
National park	Field trips			Lectures		Museum attendance	Total contacts made	Park visitors during period
	Number	Attendance	Auto caravans, attendance	Number	Attendance			
Bryce Canyon.....	170	2,994	-----	278	13,353	-----	16,347	41,572
Crater Lake.....	132	1,608	1,860	123	14,051	18,347	35,866	170,284
General Grant.....	43	1,365	-----	47	15,686	8,080	25,131	51,995
Glacier.....	575	7,856	2,717	426	28,180	26,400	65,153	63,497
Grand Canyon.....	274	4,468	6,995	1,008	48,698	65,637	125,798	156,964
Grand Teton.....	-----	-----	-----	63	2,675	3,970	6,645	62,000
Hawaii.....	110	1,251	-----	190	6,062	4,834	12,147	124,932
Lassen.....	21	154	-----	4	188	8,677	9,019	56,833
Mesa Verde.....	226	4,090	15,103	118	7,301	13,669	40,163	18,003
Mount Rainier.....	444	7,421	-----	425	71,854	299,325	378,600	293,562
Rocky Mountain.....	54	759	148	78	4,139	13,429	18,475	265,663
Sequoia.....	104	3,711	2,151	468	69,458	22,506	97,826	143,573
Yellowstone.....	1,579	80,318	42,394	1,315	553,633	216,064	892,409	221,248
Yosemite.....	678	19,029	5,636	1,672	251,949	274,989	551,603	461,855
Zion.....	203	6,802	-----	389	18,127	13,710	38,639	59,186
Total.....	4,613	141,826	77,004	6,604	1,105,354	989,637	2,313,821	2,191,167

Total number of contacts on all field trips.....	141,826
Total number of contacts on all auto caravans.....	77,004
Total number of contacts at all lectures.....	1,105,354
Total number of contacts at all museums.....	989,637

Grand total..... 2,313,821

Under "Museum attendance," Mount Rainier and Rocky Mountain, the figures given include estimated number of persons using nature trails.

September figures estimated.



Graph showing steady increase in use of educational facilities compared with similar increase in park attendance. This year, for the first time, the number of contacts made by ranger naturalists was greater than the total number of visitors in those parks where educational facilities were available. In this graph only the parks offering such facilities have been considered.

REPORT OF THE FORESTRY DIVISION

ANSEL F. HALL, Chief Forester, Berkeley, California
JOHN D. COFFMAN, Fire Control Expert

There has been considerable increase in the forest protection activities within the national parks, as a result of serious increase in insect infestations and a fortunate corresponding increase in the appropriation for insect and tree disease control to combat these serious conditions.

The unusual drought conditions of the past few years have unfortunately been favorable to an increase in the bark-beetle infestations, so that many of the normal infestations have rapidly increased to epidemic proportions. This increase has also been aided in a few instances as, for example, in Glacier National Park, by the occurrence of forest fires during the past few years, which leave in their wake weakened trees that prove easy prey to the attacks of bark beetles and tend to concentrate the attacks of such beetles in the regions of such burns.

Conditions of this character have resulted in such a heavy concentration of the mountain pine beetle (*Dendroctonus monticolæ*) in the North Fork of the Flathead drainage in both Glacier National Park and the Blackfoot National Forest that, upon recommendation of the Bureau of Entomology, the attempt to control this infestation was abandoned, because of the small promise of success and the exposure of the area to reinfestation from outside infested areas.

The 1932 Interior Department appropriation bill carried an item of \$70,000 for insect and tree-disease control, which was a material increase over former

allotments for this purpose and made possible very essential bark-beetle control in Yellowstone, Mount Rainier, Crater Lake, Yosemite, General Grant, and Sequoia National Parks and maintenance follow-up work in Glacier National Park within areas treated last year.

The deficiency in precipitation is unfortunately more marked during the present season than last year, so that according to entomologists the prospects are excellent for continued serious development of bark-beetle infestations within the forests of the West. This makes it essential that follow-up maintenance control be provided for all those areas worked this year if permanent benefits are to be derived from the funds already expended.

In addition to bark-beetle control, operations in blister-rust control were continued in Acadia and Mount Rainier National Parks. It is hoped that in the calendar year 1932 the initial control work for blister-rust may be completed in Acadia Park.

Although a slight increase was made in the amount allotted to blister-rust control in Mount Rainier National Park this year, so many evidences of the spread of the disease were found that the work should be still further speeded up next year and initial control completed within the next couple of seasons in all areas which it is finally decided should be worked. A more complete field supply is being made this summer upon which to base the final decision as to the specific areas to be included in the control project.

Excellent cooperation has been rendered in every instance by the representatives of the Bureau of Entomology and the Office of Blister Rust Control in furnishing technical advice and field assistance in connection with insect control and blister-rust projects.

One development of the past year which is worthy of note is the very decided progress in Yellowstone National Park in providing for adequate attention to forestry problems. Yellowstone forests are seriously threatened with a devastating infiltration of bark beetles from heavily infested surrounding regions, and the utmost care must be exercised to discover and control all threatening infestation as promptly as it becomes established.

To discover such infested areas, a careful examination of all stands susceptible to attack must be made each season. In connection with this work an accurate type map is essential, which will likewise indicate the distribution of species susceptible to blister rust and other tree diseases and insect attacks, as well as forest types of varying degrees of inflammability and fire hazard of which it is necessary to have record for effective fire-control plans.

During the past year a member of the Yellowstone ranger organization, who has had technical training as a forester and practical experience as a park ranger, was definitely assigned to the special work of handling forestry problems under the general direction of the chief ranger, including type mapping, forest entomology, timber operations, and fire protection.

Material progress was made in the preparation of an intensive type map, which work is being continued during the present field season; and the Yellowstone insect control project of the past spring, although the first major project of this character for this park, was planned and carried out with such care and detail that it has received the heartiest commendation of representatives of the Bureau of Entomology for its efficiency.

Organization to provide similar intensive supervision for forest problems is essential in a number of other parks if the pressing problems now demanding serious attention are to be efficiently handled.

A forestry policy for the national parks was prepared, approved by the director, and distributed to the field, which more effectively defines the objectives for the various lines of forest activities within the parks.

With increased appropriations for fire-prevention personnel, equipment, and physical improvements, material advancement has been made in providing the parks with more effective fire protection organizations, fire suppression equipment, and fire lookout houses and other buildings essential to fire protection. Much remains, however, to be accomplished before the protection organizations will have reached the degree of effectiveness essential for the adequate protection of the park forests and structures.

During the past spring a suggested code for fire-prevention safeguards for park buildings was distributed to the field to serve as an inspection guide and for suggestions pending its revision for permanent adoption. Material assistance has been received from the National Board of Fire Underwriters and the National Fire Protection Association in furnishing to the parks and monuments literature relating to fire-prevention safeguards for buildings. The local representatives of the National Board of Fire Underwriters have been gen-

erous in furnishing expert advice when requested in connection with building inspection, testing fire apparatus and fire streams, and in recommending suitable fire-protection installations where special problems are involved.

During the past year the National Fire Protection Association has effected the organization of a forest committee dealing with forest protection and forest fire equipment. The National Park Service is represented on this committee through its fire-control expert, who is also a member of the equipment committee of the California Rural Fire Institute.

Field examinations were made by the fire-control expert and fire-protection programs prepared and approved for various parks. The fire-control expert also participated in six fire training meetings held in the various parks during the spring.

Cooperation in fire suppression between the park organizations and the adjacent Forest Service and State fire protection organizations proved most satisfactory and harmonious.

Features of the past year's developments deserving special mention are: The further extension of the fire lookout system in several parks; the material progress in the fire-trail construction program in Glacier Park; a material start in the construction of a very valuable system of fire motorways in Crater Lake Park; the Mount Harkness fire lookout and meteorological station in Lassen Volcanic National Park, which is one of the finest, if not the finest, of fire lookout buildings in the country; the Mount Sheridan fire lookout building in Yellowstone Park, which probably rates next to the Mount Harkness lookout; and the purchase by a number of the parks of fire trucks for the quick transportation of men and equipment to roadside and forest fires.

During the calendar year 1930 a total of 150 fires burned inside the boundaries of the national parks. The record of distribution of these fires by parks, area burned, causes, and expenditures, is given in the appended annual fire report.

NATIONAL PARK SERVICE FOREST FIRE STATISTICS, CALENDAR YEAR 1930

Park	Classification of fires				Location of origin of fires				Area burned inside parks (to nearest whole acre)			
	A	B	C	Total	Inside parks		Outside parks		Timber	Brush	Grass	Total
	1/4 acre or less	Between 1/4 and 10 acres	10 acres or over	All classes A, B, and C	On Government lands	On private lands	Entered park	Confined to outside areas				
	Number	Number	Number	Number	Number	Number	Number	Number	Acres	Acres	Acres	Acres
Acadia.....		2	1	3	2			1		7		7
Bryce Canyon.....		1		1								
Carlsbad Caverns.....												
Crater Lake.....	2	9		11	11				17	1		18
General Grant.....	2	1		3	3							
Glacier.....	36	1	2	39	35	4			789			789
Grand Canyon.....	8	2		10	10				3			3
Grand Teton.....	1			1	1							
Great Smoky Mountains.....			1	1	1				100			100
Hawaii.....												
Hot Springs.....	4	9		13	12		1		8		2	10
Lassen Volcanic.....	3	1		4	3		1		1			1
Mesa Verde.....												
Mount McKinley.....		1	1	2	2							
Mount Rainier.....	4	1		5	4			2	2,218	394	588	3,200
Platt.....		3	2	5	5						73	73
Rocky Mountain.....	8	2		10	6	2		2	1			1
Sequoia.....	10	3	2	15	12			3	6			6
Wind Cave.....			1	1	1						15	15
Yellowstone.....	20	4	2	26	24			2	100	4	6	110
Yosemite.....	4	6	1	11	9		2		5	1	3	9
Zion.....												
Total.....	102	45	13	160	139	6	5	10	3,248	407	687	4,342

National Park Service forest fire statistics, calendar year 1930—Continued

Park	Timber destroyed inside parks			Costs of fire suppression						
	Government	Private	Total	Personal services	Supplies, transportation, etc.	Equipment	Indirect costs prorated	Total	Salaries of park employees	Grand total
	M. B. F.	M. B. F.	M. B. F.	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars	Dollars
Acadia.....				1,484.23	179.10			1,663.33	78.71	1,742.04
Bryce Canyon.....							3.50	3.50	9.20	12.70
Crater Lake.....				599.70			253.93	853.63	130.00	983.63
General Grant.....				96.25			28.40	124.65	39.73	164.38
Glacier.....	800		800	11,542.51	6,394.10	855.00	1,218.00	20,009.61	363.72	20,373.33
Grand Canyon.....	1		1	63.28	1.32		17.51	82.11	51.27	133.38
Grand Teton.....	1		1							
Great Smoky Mountains.....				532.13			30.34	562.47		562.47
Hot Springs.....									25.00	25.00
Lassen Volcanic.....				35.00	20.79			55.79	70.75	126.54
Mount Rainier.....	33,270		33,270	1,718.88	1,055.53			2,774.41	162.00	2,936.41
Platt.....									35.00	35.00
Rocky Mountain.....									33.80	33.80
Sequoia.....	3		3	138.40	77.20		34.60	250.20	125.60	375.80
Yellowstone.....	20		20	439.10	199.20		200.75	839.05	135.75	974.80
Yosemite.....	1		1	140.01	46.93		1.83	188.77	174.97	363.74
Total.....	34,096	0	34,096	16,789.49	7,974.17	\$55.00	1,788.86	27,407.52	1,435.50	28,843.02

M. B. F.—Thousand board feet. Figures on timber destroyed are estimates and not actual cruises.

¹ Acadia costs include cost of suppressing a class C fire outside, threatening the park.

Park	Causes of fires									
	Lightning	Railroads	Camp fires	Smokers	Brush burning	Incendiary	Lumbering	Miscellaneous	Total man caused	Grand total
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Acadia.....				3					3	3
Bryce Canyon.....				1					1	1
Carlsbad Caverns.....										
Crater Lake.....	11									11
General Grant.....			1	2					3	3
Glacier.....	18		8	9	4				21	39
Grand Canyon.....	6			2	1			1	4	10
Grand Teton.....					1				1	1
Great Smoky Mountains.....	1									1
Hawaii.....										
Hot Springs.....			1	10				2	13	13
Lassen Volcanic.....	3					1			1	4
Mesa Verde.....										
Mount McKinley.....										
Mount Rainier.....	3			1	1			1	3	6
Platt.....			1	4					5	5
Rocky Mountain.....			4	5				1	10	10
Sequoia.....	2		5	2	2	1		3	13	15
Wind Cave.....								1	1	1
Yellowstone.....	11		2	10	1			2	15	26
Yosemite.....	4		3	1	1			2	7	11
Zion.....										
Total.....	59	0	25	50	11	2	0	13	101	160

¹ Outside park and possibly a smoker fire.

National Park Service forest fire statistics, calendar year 1930—Continued

Park	Classification of fires according to cost of suppression (includes only those fires which burned inside park boundaries)									Total
	\$25 and under	\$26 to \$50	\$51 to \$100	\$101 to \$200	\$201 to \$500	\$501 to \$1,000	\$1,001 to \$2,000	\$2,001 to \$5,000	Over \$5,000	
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Acadia.....	1	1								2
Bryce Canyon.....	1									1
Carlsbad Caverns.....										
Crater Lake.....	3	5		3						11
General Grant.....	2			1						3
Glacier.....	25	3	1	4	2	1	1	1	1	39
Grand Canyon.....	9		1							10
Grand Teton.....	1									1
Great Smoky Mountains.....						1				1
Hawaii.....										
Hot Springs.....	13									13
Lassen Volcanic.....	2	1	1							4
Mesa Verde.....										
Mount McKinley.....										
Mount Rainier.....	1	1			1			1		4
Platt.....	5									5
Rocky Mountain.....	8									8
Sequoia.....	11			1						12
Wind Cave.....	1									1
Yellowstone.....	22				2					24
Yosemite.....	7	1	3							11
Zion.....										
Total.....	112	12	6	9	5	2	1	2	1	150

REPORT OF SANITATION DIVISION

H. B. HOMMON, Sanitary Engineer, U. S. Public Health Service, San Francisco, Calif.

In accordance with an agreement between the Director of the National Park Service and the Surgeon General of the Public Health Service, made in 1921, sanitary engineers of the Public Health Service continued, as in previous years, to cooperate with the superintendents of the national parks and custodians of the national monuments on all problems of sanitation. The general plan of work consisted of general inspections of hotels, lodges, and all other places where operators handled or served food products or provided lodgings; inspections of automobile and housekeeping camp grounds and Government messes; inspection of water supplies, sewage-treatment plants and garbage incinerators; preparation of plans for water-supply systems, sewage-treatment plants, and garbage incinerators; mosquito-control work; and miscellaneous activities pertaining to sanitation.

INSPECTION OF HOTELS AND LODGES

During the year inspections were made at hotels, lodges, and other public places handling or serving food products in 17 national parks and 4 national monuments. Each year shows not only a continued improvement in general sanitary conditions at hotels, lodges, cafeterias, stores, etc., but a better understanding and more cooperation on the part of operators in matters pertaining to sanitation.

Some difficulties have been experienced during the past year, as in other years, with regard to the operation and maintenance of water supplies, sewerage systems, and treatment plants owned and operated by the public utilities. It is believed that the only permanent solution to this problem is for the Government to take over all sanitary facilities and charge the utilities for operation and maintenance.

The housekeeping cottages constructed at Sunrise and Paradise Valley by the Rainier National Park Co. complied with the standard plan adopted by the National Park Service for cottages having two double beds and kitchen, except for size of building, whereas the partition was omitted in the cottages with one bed. The general manager of the Rainier National Park Co. stated his company was satisfied with the cottage with two rooms and kitchen and

that the tourists were well pleased with this type of cabin. He stated, however, that his company had constructed a few of the cottages with bedroom and kitchen according to the standard plan but that the tourists did not consider them favorably and that the partitions between the kitchens and bedrooms were removed.

The superintendent of the park stated that there had been no complaints against the cottages at Sunrise and Paradise Valley and the local managers reported that many favorable comments had been made by tourists regarding the conveniences provided in the cottages.

The housekeeping cottages at Mount Rainier were inspected in July by the writer and they were found substantially constructed, equipped with standard plumbing fixtures, and provided with comfortable beds and suitable cooking stoves, tables, and benches. The general sanitary conditions were highly satisfactory.

The general impression gained from the inspections and from personal interviews with tourists and various officials of the Government and operators, was that the cottage with the two bedrooms and kitchen, separated by wood partitions, is acceptable to the tourist and is a practical unit from the standpoint of operation and maintenance. The only information obtained regarding the single room and kitchen with partition was that from the operator whose comment has already been given.

At Crater Lake the operator stated that his company would submit plans this fall for improvements to the housekeeping cottages that will bring them up to practically the standard plan recommended by the National Park Service for the two rooms and kitchen. He believed the tourists do not want a partition between the kitchen and bedroom.

From the information obtained at Mount Rainier and Crater Lake, it would appear that the housekeeping cottages constructed in conformance with the standard plan recommended by the Park Service for two rooms and kitchen is a satisfactory unit for the tourists and operators. The two operators referred to do not believe the tourists want a partition to separate the kitchen from the bedroom. This, however, may be due to the fact that the buildings constructed are smaller than the one recommended by the Park Service and that a partition in the smaller building makes the space appear to be too cramped for comfort.

The writer believes that real progress has been made during the past year toward the adoption of the standard plans and equipment for housekeeping cottages in the national parks. It is recommended, however, that the standard plan for the single-room cottage be modified to the extent of omitting the partition wall between the bedroom and kitchen. Consideration also might be given to reducing to a limited extent the size of the two different types of building.

INSPECTION OF AUTOMOBILE CAMPS

The automobile camps were taxed to their limits in many of the parks, but there were only a very few complaints regarding the accommodations furnished or the general sanitary conditions. The bears have caused a considerable annoyance to tourists in many of the camps and their depredations at night, particularly with reference to breaking into cars and tents and overturning garbage cans, have brought about a problem that should be corrected as early as possible.

During the last few years the camps have been enlarged and better accommodations provided and there have been installed in practically all the parks new and larger water-supply systems, sewerage systems and treatment plants, and garbage incinerators.

The costs of enlarging and equipping the camps and installing the utilities have been very high and in some of the parks there have not been provided sufficient funds for proper maintenance and operation.

WATER SUPPLIES

The drought of the past two years affected the supplies in the parks and monuments to such an extent that many of them, believed to be ample for many years, had to be augmented from other sources. Fortunately there were no serious shortages, but the experience will be a guide in developing new supplies for the future.

The major work done during the year in connection with water supplies included cooperation with the superintendents and chief engineer of the National Park Service in getting out data and plans for new or supplementary supplies for Mammoth Hot Springs in Yellowstone, Yosemite Valley, Tuolumne Meadows and Mariposa Grove in Yosemite, Giant Forest and Ash Mountain in Sequoia, headquarters and rim areas in Crater Lake, Many Glacier, headquarters and Manzanita Lake in Lassen, Sunrise Camp in Mount Rainier, South Rim of the Grand Canyon, headquarters at Wind Cave, and Carlsbad Caverns.

In addition to the work outlined above, most of the supplies in the national parks and monuments visited were inspected and a large number of bacteriological and chemical analyses made of samples of water.

The problem of securing a sufficient volume of pure water for the large number of employees and visitors in some of the parks and monuments is rapidly becoming serious and in the near future it will be necessary to take water from the larger streams and rivers and install filtration and disinfection plants. Up to the present time only two supplies in the parks are sterilized.

SEWAGE DISPOSAL

Sewage-treatment plants were designed for Mammoth Hot Springs in Yellowstone, headquarters area in Lassen, and Longmire in Mount Rainier. Recommendations also were given for disposal of sewage in many smaller places in other national parks and many of the monuments.

A sewerage system and sewage-treatment plant, described in the annual report for 1930, were constructed by force account during the year at Yosemite Valley, at a cost of approximately \$165,000. The infiltration in the new sewer system in September was approximately 2,500 gallons per mile and it is believed that it will be considerably less than 10,000 gallons when the water table is high in the spring. These figures represent volumes of infiltration water far below those ordinarily permitted in sewer construction work. The treatment plant was practically completed on June 30, and after a trial test with river water in the tanks on July 9, it was placed in operation on August 8. Although it is too early to predict what results will be obtained, the operation to date indicates that a highly satisfactory effluent will be produced, that there will be no odors, and that the cost of operation will be reasonable.

Director Albright and the House Appropriations Committee for the Interior Department, together with Colonel Thomson and members of his staff, were present when the treatment plant was first placed in operation, and all were pleased with the manner in which the plant was working and the general appearances of the structures and grounds.

This plant, as noted above, was constructed by force account, and judging from estimates given by contractors, the cost would have been at least \$200,000 if the work had been done by contract.

The sewage-treatment plant at the South Rim of the Grand Canyon continued to produce during the year an effluent equal in quality, from a bacteriological standpoint, to drinking water. This plant has attracted considerable favorable comment throughout the country, particularly in the Southwest where the drought of the past two years has made it necessary to consider every possible means of obtaining additional water for domestic, industrial, and irrigational purposes.

GARBAGE DISPOSAL

The plans originally prepared for incinerators for burning the wet garbage produced in the parks included provisions for burning wood as auxiliary fuel. It was assumed that wood was plentiful and would be more economical than fuel oil. Experience has proven, however, that wood of the kind that is available is more expensive, and plans were prepared for a new design that will use fuel oil and have other improvements. The units now in use have proven very satisfactory from every standpoint except fuel economy, and the costs for installation are far below those for commercial incinerators suitable for the parks. It is estimated that the new design will lower the fuel cost approximately 50 per cent.

The average amount of garbage and refuse incinerated daily in 10 hours in 1 unit at Old Faithful during July was 126 cans of garbage and 1.2 loads of dry refuse. No data are available as to the weight of this material, but from information available in other parks it is reasonable to estimate that the total weight was over 5 tons. This is the largest amount of garbage and refuse incinerated daily in one unit for one month in any of the parks.

The waste tin-can baling machines, operated in Yosemite and at the Grand Canyon to bale waste cans, have operated satisfactorily for several years. The cans are reduced 94 per cent in volume and disposal of the bales at Yosemite is by dumping in a ravine and covering. At the canyon the bales are shipped by the Santa Fe Railway Co. to its reclaiming plant at Chicago, but no data can be obtained from the railroad company regarding the actual value of the products recovered. From the information available it is believed that the cost of shipping the baled cans out of the parks will be greater than the value of the materials recovered.

A used baling machine was purchased from the American Can Co. by the superintendent of Mount Rainier Park and installed at a net saving of \$700. Since this machine and those used in the other parks were made by the American Can Co. and are no longer being made, and since the supply of used machines has been exhausted, it is planned to recommend another type, recently put on the market, for use in the parks. The cost of this machine will be approximately \$1,200, which is practically the same as estimates given by machine shops for the design used to date.

REPORT OF FISH-CULTURAL INSPECTIONS AND ACTIVITIES

FRED J. FOSTER, District Supervisor, Bureau of Fisheries

The creation of the Rocky Mountain District of the Bureau of Fisheries and the placing of the writer in charge of that district has necessitated a slight change in the cooperative policy between the National Park Service and Bureau of Fisheries outlined in last year's report. The Commissioner of Fisheries has relieved the writer of cooperative work with the National Park Service in national parks located east of the Mississippi River and in the States of Washington and Oregon. The fish-cultural activities in the eastern parks will be looked after directly by the Washington office, and those in Washington and Oregon by the Seattle office.

The writer will continue supervision of the fish-cultural work and investigations in the following national parks: Glacier, Yellowstone, Teton, Rocky Mountain, Grand Canyon, and give such assistance as may be possible to the parks located in California.

During the past year approximately one-third of the writer's time has been devoted to fish-cultural work and investigations in the above national parks, principally, however, in administrative matters.

This partial loss of the writer's services has, however, been more than offset by the detail of a party of trained biologists, under the immediate direction of Dr. A. S. Hazzard, of the Bureau of Fisheries, who have started a systematic study of the waters of the national parks, to be carried on during a period of approximately five years. These studies should add materially to the knowledge of aquatic life in the national parks, as well as forming a basis for a comprehensive stocking policy for fishes and indicating general policies necessary to the maintenance of a maximum of aquatic life.

FISH-CULTURAL ACTIVITIES

YELLOWSTONE PARK

During the present season the take of blackspotted trout eggs in Yellowstone Park increased to 17,500,000, which is a greater number than for either of the past two years and above the average for the past 10 years.

It is of interest that 1,000,000 grayling eggs were taken, experimentally, at Grebe Lake, and it is believed upward of 10,000,000 eggs of this species may be taken hereafter. Inasmuch as few waters in the United States now contain grayling and, except in rare instances, this species has been declining in numbers, the possibility of fish-cultural work with this species is of considerable importance.

In accordance with the suggestion of the director, an attendant in uniform was placed in the aquarium room at Yellowstone Lake Hatchery for the purpose of explaining to visitors the aquarium exhibit and the cooperative work of the Bureau of Fisheries and National Park Service. This service, together with an attractive aquarium display, met with very great popular favor. Up to August 20, 24,501 visitors were afforded opportunity of seeing this work and having it explained.

The Mammoth rearing pools were operated throughout the year and a greatly increased number of fish from 3 to 8 inches in length were planted in park waters as a result. It is regretted, however, that water conditions at the Mammoth pools do not justify the continued operation during the winter months.

A new site has been selected near Old Faithful, where rearing pools will be constructed for operation throughout the entire year, as soon as funds are available. In this connection attention is called to the necessity for increased fish-cultural facilities to take care of park waters, as, with increased fishing from year to year, it is problematical how long waters of the national parks can be maintained in productivity under present conditions.

Reports of the superintendent show an increased number of fish taken in Yellowstone Park this season. While this indicates that fish are still in abundance in certain waters, it should not be construed as an increased number of fish in these waters but rather as an increase in the number of fishermen who are enjoying the privilege of removing fish from the waters of Yellowstone Park.

The writer wishes to express appreciation for the appointment of a park ranger for fisheries activities, as recommended in last year's report. His services have been very valuable to both the Park Service and the Bureau of Fisheries and should become increasingly so as time goes on.

GLACIER NATIONAL PARK

The Bureau of Fisheries operates a small hatchery at Glacier Park entrance during the summer months. This hatchery has been operated to capacity, and in addition thereto the Bozeman Station of the Bureau of Fisheries has supplied two carloads of trout for planting in Glacier Park waters during the present season.

There is urgent need of additional fish-cultural facilities in Glacier Park, particularly on the west side. The Commissioner of Fisheries has approved the expenditure of a limited sum for rearing pools, and inspection has been made of several sites, none of which is considered suitable, owing to the limited volume of water at a suitable temperature. Studies are being continued with the view to determining the best possible location.

TETON NATIONAL PARK

At the present time the Teton National Park is remote from any State or Federal fish hatchery, the Lake Hatchery at Yellowstone Park being the nearest. Since the Yellowstone Lake Hatchery is operated but a short period during the summer months and can not adequately supply the needs of Yellowstone Park, the Teton National Park and the Jackson Hole Region in general is probably in greater need of a hatchery and rearing pools capable of being operated throughout the entire year than any other national park, or any other section of the West.

There has been a tremendous increase in travel in the Jackson Hole country during the past three years, and the limited fish available for planting within the waters of this area and the great expense necessary to transport these fish is a matter of serious concern. Here, also, the Commissioner of Fisheries has authorized the expenditure of a small sum for rearing pools, but, as in Glacier Park, an appropriation of not less than \$60,000 should be made as soon as possible in order to prevent the continued serious depletion of waters of this section.

During the present season the waters of Teton National Park are being examined by Dr. A. S. Hazzard, associate biologist, United States Bureau of Fisheries, assisted by Drs. Vasco M. Tanner and Wayne B. Hales, of the Brigham Young University, Provo, Utah, and Messrs. J. Everett Hancy and Marion J. Madsen, senior biological assistants. A complete report of these investigations will be transmitted later during the year when material collected has been examined. It is proposed to have these investigations continued in Glacier National Park next season.

GRAND CANYON NATIONAL PARK

A shipment of rainbow trout eggs was successfully hatched at Havasu Creek, Grand Canyon National Park, this past winter. Shipments of Loch Leven and rainbow trout eggs were also planted in Bright Angel Creek and a consignment of brook trout eggs planted in Clear Creek.

The hatching of these fish in Havasu Creek and the planting of eyed eggs in the other streams represents as difficult plantings as are experienced anywhere in the United States, as each shipment has to be transported by mule-back and then, in some instances, for miles on the backs of the rangers.

The superintendent and chief ranger of Grand Canyon National Park are to be greatly commended for their interest and acceptance of hardship in so successfully stocking their limited park waters.

ROCKY MOUNTAIN AND SEQUOIA NATIONAL PARKS

Rocky Mountain National Park has not yet been visited by the writer, but it is hoped that a preliminary study of waters in this park may be made during the present fall.

It is also planned to visit Sequoia Park sometime during the winter months.

ACKNOWLEDGMENT

The writer wishes to express his sincere appreciation for the whole-hearted interest and cooperation extended him by the personnel of the National Park Service, who have always been ready to assist in doing all they can and have freely given of their time and information.

REPORT OF PRELIMINARY WILD LIFE SURVEY

GEORGE M. WRIGHT, Scientific Aid, Berkeley, Calif.

Preliminary investigation of the status of animal life in the national parks has progressed so satisfactorily that presentation of the final report in this calendar year is practically assured. In fulfillment of the cause which sponsored the undertaking of this survey it is hoped that permanent organization of the wild-life division of the National Park Service will be effected soon after the appearance of the report. Need for a defined policy of wild-life administration becomes increasingly apparent each season. Members of this party are united in beseeching the early adoption of a constructive program.

Opportunity is taken here for our grateful acknowledgment of the fine cooperation received throughout the year from the personnel of the Washington and San Francisco offices, as well as from the superintendents and their staffs.

PROGRAM AND METHODS

Detailed schedules of work for the period were arranged in accordance with the broad program of the project, which is:

(a) To assist the director in formulating wild-life policies in the National Park Service.

(b) To provide data for the director useful in organizing a permanent wild-life division.

(c) To promote adequate consideration of wild-life requirements in drafting boundaries of parks yet to be created.

(d) To determine the major animal problems in each park, at the same time giving as much assistance as possible in meeting those problems where the immediate emergency is great.

Space will not permit of enumerating methods employed. They will be fully discussed in the final report. This is important, as these methods will be largely applicable to any sustained program of animal administration, and it is planned that the report will thus have a lasting reference value. This year's experimentation with various approaches to problems of administrative policy, as well as specific questions, means that certain techniques can be recommended as having proven value.

REPORT OF PROGRESS

Some phases of the work in which definite progress has been made are briefly discussed here. Others are merely mentioned.

Cooperation externally.—Probably no other resource of the national parks is more absolutely dependent for its welfare upon successful cooperation with other governmental bureaus and external agencies. Parks are not independent biological units and animals can not read boundary markers. Cooperative measures have been studied and members of the party have made contacts which would promote their enactment. Mr. Dixon was official delegate to the

Kaibab deer conference in May. He and Mr. Thompson, who also attended, reported real progress through agreement of all parties upon a definite program.

Areas considered for park or monument status.—A field party visited Death Valley to study the suitability from a faunal standpoint of the proposed monument boundaries. The report rendered exemplifies this important phase of the work. Brief visit was made to the proposed Everglades National Park area.

Appreciation of wild-life needs.—The greatest step forward observed this year is the more acute consciousness of the wild life resource which pervades the parks' personnel generally, and the increasing realization that mere security from human trespass is not sufficient to maintain this asset unimpaired or to restore it to its original value.

A wild-life division.—Careful evaluation of wild-life requirements, the product of field observations and discussions with many people, both scientists and laymen, has resulted in the formulation of concrete ideas for the organization of a wild-life division. These thoughts, together with a tentative program, will be presented soon for the director's consideration.

The historical record.—This must be had to determine the status of wild life before the encroachment of civilization, and this original picture is an important part of the knowledge upon which intelligent handling of the animal is predicated. Because much of this information lies where it is rapidly going beyond reach, i. e., the eye-witness accounts of early settlers, effort has been made to gather such data. These notes will be in the files until a comprehensive record of the history of the animal life can be made in each park.

Game surpluses.—Theoretically, with all factors in balance, the numbers of all game species would be automatically checked. Good enough! But natural conditions do not obtain. Surpluses exist. Some of these difficulties have been successfully met. Bears and white pelicans in Yellowstone are current questions included in the field party's program. Other problems involving increase beyond range capacity are imminent. The problem of elk in Rocky Mountain Park was studied, Mr. Dixon and Mr. David Madsen collaborating on a report which recommended certain boundary additions.

Reintroduction of exterminated species.—This phase of animal management will undoubtedly be conspicuous in the future, and data are being gathered on species that have disappeared from any park. Looming up are the possibilities of restoring the Sierra mountain sheep to Yosemite and the Merriam turkey to the Southwest parks. The survey has gathered much material on the latter problem. Projects for the restoration of fisher and wolverine are future possibilities.

Conflict between the animal and human species.—Many problems which the survey has tried to assist park superintendents in solving fall in this class. The field party has assisted in the following cases: The bear problem, of greatest moment in Yellowstone but also presenting difficulties in Yosemite, Rainier, and Rocky Mountain; porcupine damage to the scene of the cliff dwellings of Mesa Verde; destruction of the scenic values along the roads in Rocky Mountain by beavers; deer damage to the landscape gardening around buildings in Yosemite, Sequoia, and other parks; undesirable effects of physiological nature to the animals themselves resulting from the tourist feeding of deer and bear and feeding of garbage to the latter; control of rodents, such as ground squirrels, around centers of human occupation in Yosemite, Rocky Mountain, and other parks; the many-sided predatory animal problem, etc.

Range depletion.—Many of the most pressing difficulties to-day relate to the concentration of animals upon ranges that will not support them. Artificial feeding is resorted to, but this is unsatisfactory for many reasons. This administrative stumblingblock is closely tied up with boundary questions. The outstanding example is to be found in Yellowstone, where elk, mountain sheep, deer, and antelope are all crowded on a pitifully inadequate range in winter. The survey is cooperating with Mr. Rush in his extensive study of this situation.

Zoological survey.—While the body of this very necessary work will have to be done by the permanent organization of the wild life department of the future, much valuable material has been assembled in the course of the survey this year.

Species in danger of extermination.—The case of the trumpeter swan is so outstanding, because this bird is on the very brink of extinction, that the largest single effort of the survey has been devoted to learning as much as possible about the remnant that still breeds in Yellowstone and to encouraging

the focusing of every available resource on a united attempt to save the largest of American waterfowl.

STATISTICAL SUMMARY OF OPERATIONS

Office.—At the office, field observations on 150 species of birds and 110 mammals were transcribed to species cards. Negatives and prints to the number of 1,445, all originating from pictures made by the field party, were added to the valuable photographic file. Increases were made to the library which now contains 126 volumes plus reprints and pamphlets to a much larger total. This year the Library of Congress system was installed. Also, a reference file was inaugurated, which is repository for all pertinent information not otherwise provided for.

The entire recording system, including species card file, photographic files, library card file, correspondence file, and reference file, is now synchronized so that data pertinent to the fauna of the national parks will not be restricted to the use of a few but will always be readily available to anyone upon inquiry addressed to the secretary.

Field itinerary.—Field work was carried on in 12 national parks, 4 national monuments, 1 proposed national park, and 1 proposed monument. There were one or more members in the field a little over half the year.

Costs.—Expenses of the year are summarized here for future reference value in setting up maintenance costs for an organized division of wild-life management. The total of \$11,200.40 compares with \$12,620.66 for the 1930 fiscal year, a decrease of \$1,420.26. The difference is largely due to the large outlay for equipment in the first year of operation. However, the items of salaries and field expense were greater in 1931 through the addition of Ben H. Thompson to the personnel.

Big game animals in various national parks estimated on the basis of censuses made in 1931

	Elk	Moose	Mule deer	White-tailed deer	Black-tailed deer	Antelope	Mountain sheep	Mountain goat	Grizzly bear	Black bear
1. Acadia.....				150						
2. Bryce Canyon.....			200							
3. Carlsbad.....			100		350					50
4. Crater Lake.....	6									
5. General Grant.....										
6. Glacier.....	670	140	1,300	2,200			260	550	120	350
7. Grand Canyon.....			2,000			19	200			
8. Grand Teton.....	50	100	150				60		10	25
9. Great Smoky Mountains.....				3						30
10. Hawaii.....										
11. Hot Springs.....										
12. Lassen.....			650		2,200					40
13. Mesa Verde.....			400							4
14. Mount McKinley ¹		60					13,250		50	15
15. Mount Rainier.....	20				500			275		175
16. Platt.....	10			6						
17. Rocky Mountain.....	430		2,500				400			20
18. Sequoia.....			4,200							200
19. Wind Cave ²	80					30				
20. Yellowstone ²	10,600	700	800			640	150		180	450
21. Yosemite.....			12,000		(³)					350
22. Zion.....	10		475				30			
Total.....	11,876	1,000	24,775	2,359	3,050	689	14,350	825	360	1,709

¹ Caribou, Mount McKinley, 25,000.

² Buffalo, Yellowstone, 1,400; Wind Cave, 100.

³ No estimate.

UNITED STATES DEPARTMENT OF THE INTERIOR

RAY LYMAN WILBUR, *Secretary*

NATIONAL PARK SERVICE

HORACE M. ALBRIGHT, *Director*

ANNUAL REPORT

OF THE

DIRECTOR OF

THE NATIONAL PARK SERVICE

TO THE

SECRETARY OF THE INTERIOR

FOR THE

FISCAL YEAR ENDED JUNE 30, 1932

AND THE TRAVEL SEASON, 1932



UNITED STATES

GOVERNMENT PRINTING OFFICE

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CONTENTS

	Page
Introduction.....	1
Summary of activities.....	2
Inspection of the parks and monuments.....	5
Plaques in memory of first director.....	5
Development of national-park policies.....	7
New national-park literature.....	9
Cooperation of outside agencies.....	11
Canadian-United States international peace reserves.....	12
Scout naturalist expeditions.....	13
Ascent of Mount McKinley.....	13
Find thermometer left by Stuck's party.....	14
Carpe-Koven tragedy discovered.....	14
Winter use.....	15
New national monuments.....	17
Additions made to existing national parks and monuments.....	18
National parks.....	18
National monuments.....	18
Acquisition of private lands.....	19
Pending boundary problems.....	20
Investigation of proposed parks and monuments.....	21
Authorized park and monument projects.....	21
Everglades project.....	22
Progress in education and research.....	22
Advisory board continues assistance.....	23
Popularity of trips afield and of camp-fire lectures.....	23
Museum expansion.....	23
Wild flower displays.....	24
Naturalist leaflets.....	24
University field classes.....	24
Yosemite school of field natural history.....	24
Libraries.....	24
Scientific research.....	25
Animal conditions.....	26
Wild-life survey.....	26
Other animal investigations.....	26
Fishing and fish-cultural operations.....	27
Preservation of park landscape.....	27
Protection of park forests.....	28
Experiments in radio communication in park work.....	29
Public utility service.....	29
Appropriations and revenues.....	31
Park road development.....	31
Superintendents' conference.....	33
Professionalizing the Park Service.....	34
Airplanes in the national parks.....	35
State-park developments.....	35
Important city park project.....	36
Service loses many friends through death.....	36
The year in the parks and monuments.....	38
Acadia National Park.....	38
Bryce Canyon National Park.....	39
Carlsbad Caverns National Park.....	39
Crater Lake National Park.....	41
General Grant National Park.....	42
Glacier National Park.....	42
Grand Canyon National Park.....	43
Grand Teton National Park.....	45

	Page
Great Smoky Mountains National Park.....	46
Hawaii National Park.....	47
Hot Springs National Park.....	48
Lassen Volcanic National Park.....	50
Mesa Verde National Park.....	51
Mount McKinley National Park.....	53
Mount Rainier National Park.....	54
Platt National Park.....	55
Rocky Mountain National Park.....	56
Sequoia National Park.....	57
Wind Cave National Park.....	58
Yellowstone National Park.....	59
Yosemite National Park.....	61
Zion National Park.....	64
National monuments.....	64
The southwestern monuments.....	65
Colonial.....	66
Devils Tower.....	66
George Washington Birthplace.....	66
Muir Woods.....	67
Petrified Forest.....	67
Conclusion.....	68
Appendix A.—Organization of the National Park Service.....	69
Appendix B.—The national parks and monuments:	
The national parks administered by the National Park Service, De- partment of the Interior.....	71
The national monuments administered by the National Park Service, Department of the Interior.....	75
The national monuments administered by the Department of Agri- culture.....	79
The national monuments administered by the War Department.....	81
The national military and other parks administered by the War De- partment.....	83
Statement of holdings acquired by deed for national park and monu- ment purposes.....	84
Appendix C.—Travel, fiscal, and miscellaneous statistics:	
Visitors to the national parks, 1917–1932.....	85
Detail comparative statistics of travel and campers, 1931–32.....	86
Visitors to the national monuments, 1927–1932.....	88
Entries of private automobiles to the national parks during the seasons 1925–1932.....	88
Automobile and motor-cycle licenses issued during seasons 1928–1932.....	89
Receipts collected from automobiles and motor cycles during seasons 1928–1932.....	89
Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expendi- tures made therefrom during recent fiscal years.....	89
Statement of amounts reappropriated and made available for expend- iture in subsequent fiscal years.....	93
Statement of amounts transferred under the authority contained in the appropriation acts to transfer 10 per cent from one appropriation to another, fiscal year 1932.....	93
Summary of appropriations for the administration, protection, and improvement of the national parks and national monuments, together with revenues received, for the fiscal years 1917–1932, inclusive.....	94
Statement of amounts transferred to emergency reconstruction and fighting forest fires under authority contained in the appropriation act, fiscal year 1932.....	94
Statement of appropriations and authorizations for road and trail work in the national parks and national monuments.....	94
Summary of educational activities in the national parks for the year ended September 30, 1932.....	95
National Park Service forest-fire statistics, calendar year 1931.....	96
Big game animals in various national parks estimated on the basis of censuses made in 1932.....	100

ANNUAL REPORT OF THE DIRECTOR OF THE NATIONAL PARK SERVICE

DEPARTMENT OF THE INTERIOR,
NATIONAL PARK SERVICE,
Washington, D. C., October 12, 1932.

The SECRETARY OF THE INTERIOR.

SIR: This is the sixteenth annual report of the National Park Service. It is submitted with pride and satisfaction because, in these troublesome times when our people have been under the great strain of anxiety and uncertainty, hundreds of thousands have sought and found in the national parks and monuments diversion, recreation, and rest, while under the protection of National Park Service officers and with the aid of facilities provided by our organization and by our utility operators.

The report, as in previous years, is seasonal for travel and construction work. The travel year ended September 30, 1932. All financial matters are recorded for the fiscal year which ended June 30.

The amazing factor in park affairs during the past year was the travel to the national parks and national monuments. Despite unemployment, and the natural disinclination even of the employed to spend savings, because of future needs, and despite a great decrease in travel by rail, the national parks and monuments were visited in the 1932 season by 3,754,596 persons, 5.9 per cent more than last year.

Reports show that large numbers of people remained in park areas longer than usual, camping more than utilizing the hotel and lodge facilities. They unquestionably found life in the mountains and woods and along the streams and lakes restful and healthful and in every way worth while, and at the same time realized that simple camp life offers more opportunities for the practice of economy than oftentimes can be found at home.

This new usefulness of the parks, particularly to people in financial difficulty, gave us unusual satisfaction. National Park Service men and women derive their greatest pleasure in contributing to the happiness of park and monument visitors. Our opportunities this year were myriad, and without regard to hours or physical effort involved these Park Service folks devoted themselves to our guests, who more than ever before appreciated our various types of service, particularly the educational features of the program and the entertainment that was provided, the latter almost always with the enthusiastic assistance of our visitors themselves.

It seems to us that the true value of the parks to America could not be more clearly shown than by the fact that, in a time of anxiety and restlessness, they were immensely useful to large numbers of our people. Undoubtedly, too, they have been a strong influence for stabilization and good citizenship.

While park travel has been surprisingly heavy, I have been seriously concerned over the lack of patronage of the hotels and transportation lines. These operations, carried on under Government supervision and at rates approved by the Government, have suffered big losses, largely because of the decline in rail travel. The public-utility operators render an efficient and highly essential public service. Many of the stockholders in these companies have invested their money solely from a sense of public obligation, in some cases at the urgent suggestion of Government officials. Several of the individual operators and some companies, too, are now in dire financial straits, and all aid consistent with Government policy and procedure must be extended to them in order that their facilities may be kept available to the public. During the season we encouraged and occasionally suggested changes in the types of service, special rates to encourage longer stays, and other measures to attract patronage. To conserve utility-operator resources and reduce losses we permitted curtailment of service, and some plants were authorized to be closed when it was apparent that the public demand for their facilities would not justify their availability during the entire season.

It has been particularly gratifying to Service officials to receive hundreds of letters commenting on the fine sense of duty and uniform spirit of kindness displayed by the personnel of the various parks in contact with the public.

In a long tour of inspection I did not hear a word of dissatisfaction or complaint from our employees about the payless furlough, loss of annual leave, and other changes in privileges and status due to economy measures. They have taken a keen interest in relief work, and have contributed their full share to community chests and other funds to meet local charity and benevolence requirements. The Washington office responded generously to the President's plea that three days' pay be contributed to the community chest of the capital city.

In view of the high spirit, personality, loyalty, zeal, and other fine qualities of this organization, it is quite natural that I should be very proud of it.

SUMMARY OF ACTIVITIES

Developments during the year in park and monument work were varied and interesting.

Congress continued to give sympathetic consideration to the needs of the national parks and national monuments. Eight pieces of legislation involving National Park Service activities were passed during the last session.

Appropriations for the fiscal year 1933 were \$7,650,620 compared with \$13,069,817.47 for 1932, which includes \$55,000 included in the first deficiency bill to partially meet expenses of forest-fire control. In July an additional \$3,000,000 was made available in the emergency unemployment relief act. Revenues for the 1932 fiscal year were \$820,654.19.

Important measures still pending on House and Senate Calendars for possible consideration next session cover the transfer of jurisdiction of the national military parks and monuments from the War Department to the Department of the Interior; the creation of a national park trust fund board to manage and invest gifts of funds

and property; and the establishment of the Everglades National Park in Florida.

Hot Springs National Park, set apart as a special reservation under one of our earliest conservation measures, the act of April 20, 1832, celebrated its one-hundredth anniversary with spectacular parades and pageants. It was made a national park in 1921, but has been managed along park lines since 1877.

Yellowstone National Park, the first national park to be established anywhere in the world, celebrated the sixtieth anniversary of its creation.

The total area of the national park and monument system was increased from 12,119,579.64 acres to 12,592,316.21 acres through the inclusion of two monuments and extensions to existing park and monument areas.

A total of 21,065.29 acres of private lands within national parks and national monuments was acquired—739.08 acres by donation, 12,792.80 by exchange, and 7,533.41 acres by purchase.

Memorial tablets to Stephen T. Mather, first Director of the National Park Service, were presented to the National Park Service and were installed in nine national parks and two national monuments, and in the Washington office.

Use of the educational facilities in the parks showed a decided increase, although the total number of visitors to the parks was less than last year. Several new types of field trips were inaugurated, including the game-stalk caravan at dusk in the Yellowstone and naturalist-conducted privately operated airplane trips over the Grand Canyon. The grand total of contacts made through the naturalist and historical staffs in the parks and monuments was 1,629,859. Field educational headquarters were maintained at Berkeley, Calif., and continued to function admirably.

Serious attention was given to the matter of determining the present status of preservation and operation of important historical and archeological sites in the United States, whether under the control of private, local, or Federal agencies.

A major concern of the Service is the protection of park forests through control of insect infestations and tree diseases. Several of these problems are discussed in detail later in this report. Notable progress is being made in providing facilities for fire prevention. With considerably over 200 fires started last year in the parks, only one reached serious proportions.

The wild-life survey, carried on for two years under private funds, remains an outstanding measure of cooperation with the National Park Service. Last year the expense was partly assumed by the Government, but cheerfully the cooperation has been extended until the National Park Service can meet the full cost of this extremely important work. The first report of the wild-life survey is now in course of publication.

Fishing conditions were unusually good throughout the system, with more fish per capita taken than ever before reported.

Outstanding among the major engineering projects supervised by the chief engineer's office were the elevator construction at Carlsbad Caverns, where the single-lift trip of 750 feet from cave floor to surface is made in slightly more than one minute; the completion of the hot-water-collection system at Hot Springs, started in 1931; the elec-

trical generating and distributing system at Sunrise in Mount Rainier National Park; deep-water well-drilling operations and power-line installation in Mesa Verde; and reconnaissance surveys for the proposed relocation of the Big Oak Flat and Glacier Point Roads in Yosemite.

An eastern engineering division was established to supervise civil engineering work in the national parks and monuments of the East, including Hot Springs, and to make advance engineering plans for eastern park and monument projects. This division is in charge of an assistant chief engineer.

Notable progress in road construction was made during the past season. The Bureau of Public Roads completed the surfacing of the Cadillac Mountain Summit Road in Acadia National Park. First Assistant Secretary Dixon represented Secretary Wilbur in a distinguished gathering present for the opening of the road to public use. This road has been pronounced one of the most beautiful scenic roads in the world. I was present with Governor Hunt of Arizona at the opening of the Rio Puerco Bridge and the north and south highway in Petrified Forest National Monument on July 3. This bridge assures access to the Petrified Forest at all times from the north.

In Yosemite National Park the Wawona Tunnel, 4,200 feet in length, was completed and the surfacing of the entire Wawona Road placed under contract. A start was made on the reconstruction of the Chinquapin-Glacier Point Road. Under an agreement reached with the city and county of San Francisco in connection with its Hetch Hetchy road-building obligations, there will shortly be initiated the reconstruction of the Tioga Road through donation of the first of five yearly increments of \$250,000.

In Rainier National Park the East Side Highway was placed under construction at three points, assuring expedition in the construction of this most important highway connecting Paradise Valley and Yakima Park.

Completion of the grading of the Transmountain Road in Glacier National Park was well along and in Rocky Mountain Park grading of the Trail Ridge Road was completed and the road opened to travel early in August. These roads are acclaimed among the outstanding mountain highways of the world.

Grading of a section of the Skyline Drive down the summit of the Blue Ridge in the central part of the proposed Shenandoah National Park has been completed, and surveys have been started in the Great Smoky Mountains National Park, contract to be let early next year for construction of the first section of a ridge road extending from Newfound Gap toward Deals Gap. Road surveys are also to be undertaken in the Mammoth Cave area. Additional progress was made on construction of the Colonial Monument Parkway in Virginia, three bridges being placed under contract in September.

The landscape division continued to function as professional adviser to the Service on architectural landscape matters. The division now has 24 professional architects and landscape architects. Of these, 5 are assigned to the eastern division, with headquarters at Yorktown, Va. The landscape work during the year fell into three general classes: Plans for and supervision of construction of buildings by both the Government and the public-utility operators; supervision of



UNVEILING MATHER MEMORIAL PLAQUE, IN YELLOWSTONE NATIONAL PARK,
JULY 4, 1932



Photograph by Lindley

THE LINDLEY-LIEK PARTY FINDS THE THERMOMETER LEFT ON MOUNT
MCKINLEY BY ARCHDEACON STUCK AND FORMER SUPERINTENDENT
KARSTENS IN 1913



NEW WAYSIDE MUSEUM OF ARCHEOLOGY, LOCATED NEAR THE TUSAYAN PUEBLO RUIN IN GRAND CANYON NATIONAL PARK



TIOGA PASS RANGER STATION, YOSEMITE NATIONAL PARK

landscape features of road construction; and the preparation of master plans for each park six years in advance of actual construction. These master plans, when finished, will give a complete picture of each park's present and future development, showing roads and trails, power and communication facilities, wilderness areas, tourist and administration centers, sewer and water systems, and other important items. In the preparation of the master plans the park superintendents, the chief civil engineer, and the sanitary engineer cooperated.

The ascent of both the north and the south peaks of Mount McKinley last spring by the Lindley-Liek party was one of the most dramatic events in mountain-climbing annals. This was only the second time the great peaks had been climbed and was the first and only time that both peaks were climbed by the same expedition. Unfortunately the triumph of the Lindley-Liek party was marred by the tragedy which occurred to the cosmic ray party, on the mountain at the same time, when Allen Carpe and Theodore Koven lost their lives through a fall into a crevasse.

INSPECTION OF THE PARKS AND MONUMENTS

The Secretary of the Interior inspected Crater Lake and the Assistant Secretary covered Carlsbad Caverns, Grand Canyon, Yosemite, Crater Lake, Mount Rainier, and Mount McKinley. The First Assistant Secretary was in Acadia and Glacier Parks representing the Secretary.

The Senate Subcommittee on Indian Affairs, studying Indian problems in the West, and consisting of United States Senators L. J. Frazier, B. K. Wheeler, and Elmer Thomas, were in Yosemite Valley in September interviewing the Indians who reside there. Congressman Scott Leavitt, of Montana, personally presented to Glacier Park and Waterton Lakes National Park in Canada framed messages from the President and pens used by him in signing the Waterton-Glacier International Peace Park Act.

My inspection tours of the year took me to all the eastern parks and monuments, and, in the West, I divided a summer trip between the Southwest, the Pacific coast, and the Rocky Mountains. I visited in the Southwest Carlsbad, Mesa Verde, and Grand Canyon Parks, and Gran Quivira, Aztec Ruins, Natural Bridges, Hovenweep, Navajo, Petrified Forest, Canyon de Chelly, and Rainbow Bridge National Monuments. I also saw the Great White Sands, Old Oraibi, and Monument Valley National Monument projects.

On the Pacific coast, the San Francisco office, Yosemite, Sequoia, and Crater Lake Parks, and Pinnacles Monument occupied all available time. In the Northwest and Rocky Mountain region I visited Yellowstone, Glacier, Grand Teton, Wind Cave, and Rocky Mountain Parks, and Scotts Bluff National Monument. The proposed parks and monuments in the Bad Lands of North Dakota, and South Dakota, and along the Oregon Trail in Nebraska and Wyoming were also inspected.

PLAQUES IN MEMORY OF FIRST DIRECTOR

In pursuance of plans formulated in 1929 to honor the memory of the late Stephen T. Mather, first Director of the National Park Service, the Stephen T. Mather Appreciation presented a number of

bronze memorial plaques to the National Park Service to be placed in the parks and monuments. Where possible these memorial tablets were located in areas especially dear to Mr. Mather.

Memorial ceremonies were held on July 4, Mr. Mather's birthday, and tablets were unveiled in Yosemite, Yellowstone, Grand Canyon, Mount Rainier, Crater Lake, Mesa Verde, Rocky Mountain, and Zion National Parks, and in Petrified Forest and Casa Grande National Monuments. One has been installed in the Washington office.

In Sequoia Park the unveiling services were held in the Giant Forest on July 10. I was happy to be able to attend the dedication at the Petrified Forest. The plaque was unveiled by my son, Robert Mather Albright. Plaques were also unveiled in the Sand Dunes State Park in Indiana, the Palisades Interstate Park in New York and New Jersey, and on the Mather Memorial Parkway in the State of Washington.

At each ceremony there were present distinguished men and women who came from far and near to join with National Park Service employees and other friends of Mr. Mather in commemorating his great work. Dr. Gilbert Grosvenor, of the National Geographic Society, and Mrs. Grosvenor made a special trip by airplane to attend the Sequoia Park services.

John Hays Hammond, chairman of the Stephen T. Mather Appreciation, sent the following telegram to the officials in charge of the various dedications:

On behalf of the officials and executive committee of the Stephen T. Mather Appreciation I extend greetings to all who are present at this dedicatory ceremony. The spirit prompting the placing of this memorial plaque was well expressed in a letter which I received two years ago from Gen. John J. Pershing of our national committee. This letter read: "While ordinarily averse to appearing on committees, I am prompted to accept in this case because of the tremendous appeal which this slight recognition of Mr. Mather's work should make to anyone familiar with it. Men of such public-spirited generosity are all too few. Recognition of this sort is small recompense for a life devoted to public service." Permit me to add the thought that appreciation of this service will increase with the years. This plaque will reveal the noble profile of one who had the vision and whose courage and perseverance brought the achievement.

Hundreds of Mr. Mather's friends who could not attend the unveiling ceremonies listened to the broadcast of the memorial service of the Bohemian Club of San Francisco through the courtesy of the National Broadcasting Co. as the unveiling ceremonies in Sequoia were being held. Ralph L. Phelps, an old friend of our former director, delivered a fine eulogy of Mr. Mather as a man and a public servant.

This beautiful memorial service of the Bohemian Club has been perpetuated for the benefit of Mr. Mather's family and close friends by William Horsley, a California friend, connected with the motion-picture industry. Mr. Horsley made not only an excellent picture of the dedication service in Sequoia, but also a record of the Bohemian Club program.

Other plaques later will be placed in seven additional parks. At some time in the near future plaques will be unveiled on the Transmountain Highway in Glacier National Park, at the Mather Grove on the Redwood Highway in northern California, and on the grounds of the University of California at Berkeley.

Mr. and Mrs. Franklin Adams, of Washington, devoted friends of Mr. Mather, have alternately acted as secretary of the Appreciation,

and to them is due the thanks of all who are interested in this fine movement to perpetuate the memory of the great and good man who built the National Park Service.

DEVELOPMENT OF NATIONAL-PARK POLICIES

Following the brief discussion of national-park policies in the 1931 annual report, careful consideration has been given to clarifying and codifying the various policies governing the establishment, preservation, protection, maintenance, use, and enjoyment of the national parks.

Fortunately, in the spring of 1932 the Secretary of the Interior made available to the National Park Service the services of Hon. Louis C. Cramton, special attorney to the Secretary, who while a Member of Congress and chairman of the Interior Department subcommittee of the House Appropriations Committee took exceptional interest in national-park affairs and played a part in building the financial structure of the national-park system that will rank in importance second only to the great achievements of Stephen T. Mather in developing the fundamental organization and policy programs of the bureau. Mr. Cramton was asked to make a careful study of the Congressional Record and of all other legislative documents relating to Yellowstone National Park, to determine what Congress, in initiating the park system, intended the national parks to be, and what policies it expected would govern the administration of the parks.

The results of the study, which is not yet completed, can best be set forth in a statement of policy as follows:

1. A national park is an area maintained by the Federal Government and "dedicated and set apart for the benefit and enjoyment of the people." Such Federal maintenance should occur only where the preservation of the area in question is of national interest because of its outstanding value from a scenic, scientific, or historical point of view. Whether a certain area is to be so maintained by the Federal Government as a national park should not depend upon the financial capacity of the State within which it is located, or upon its nearness to centers of population which would insure a large attendance therefrom, or upon its remoteness from such centers which would insure its majority attendance from without its State. It should depend upon its own outstanding scenic, scientific, or historical quality and the resultant national interest in its preservation.

2. The national-park system should possess variety, accepting the supreme in each of the various types and subjects of scenic, scientific, and historical importance. The requisite national interest does not necessarily involve a universal interest, but should imply a wide-spread interest, appealing to many individuals, regardless of residence, because of its outstanding merit in its class.

3. The twin purposes of the establishment of such an area as a national park are its enjoyment and use by the present generation, with its preservation unspoiled for the future; to conserve the scenery, the natural and historic objects and the wild life therein, by such means as will insure that their present use leaves them unimpaired. Proper administration will retain these areas in their natural condition, sparing them the vandalism of improvement. Exotic animal or plant

life should not be introduced. There should be no capture of fish or game for purposes of merchandise or profit and no destruction of animals except such as are detrimental to use of the parks now and hereafter. Timber should never be considered from a commercial standpoint but may be cut when necessary in order to control the attacks of insects or diseases or otherwise conserve the scenery or the natural or historic objects, and dead or down timber may be removed for protection or improvement. Removal of antiquities or scientific specimens should be permitted only for reputable public museums or for universities, colleges, or other recognized scientific or educational institutions, and always under department supervision and careful restriction and never to an extent detrimental to the interest of the area or of the local museum.

4. Education is a major phase of the enjoyment and benefit to be derived by the people from these parks and an important service to individual development is that of inspiration. Containing the supreme in objects of scenic, historical, or scientific interest, the educational opportunities are preeminent, supplementing rather than duplicating those of schools and colleges, and are available to all. There should be no governmental attempt to dominate or to limit such education within definite lines. The effort should be to make available to each park visitor as fully and effectively as possible these opportunities, aiding each to truer interpretation and appreciation and to the working out of his own aspirations and desires, whether they be elementary or technical, casual or constant.

5. Recreation, in its broadest sense, includes much of education and inspiration. Even in its narrower sense, having a good time, it is a proper incidental use. In planning for recreational use of the parks, in this more restricted meaning, the development should be related to their inherent values and calculated to promote the beneficial use thereof by the people. It should not encourage exotic forms of amusement and should never permit that which conflicts with or weakens the enjoyment of these inherent values.

6. These areas are best administered by park-trained civilian authority.

7. Such administration must deal with important problems in forestry, road building and wild life conservation, which it must approach from the angles peculiar to its own responsibilities. It should define its objectives in harmony with the fundamental purposes of the parks. It should carry them into effect through its own personnel except when economy and efficiency can thereby best be served without sacrifice of such objectives, through cooperation with other bureaus of the Federal Government having to do with similar subjects. In forestry, it should consider scenic rather than commercial values and preservation rather than marketable products; in road building, the route, the type of construction and the treatment of related objects should all contribute to the fullest accomplishment of the intended use of the area; and, in wild life conservation, the preservation of the primitive rather than the development of any artificial ideal should be sought.

8. National park administration should seek primarily the benefit and enjoyment of the people rather than financial gain and such enjoyment should be free to the people without vexatious admission charges and other fees.

9. Every effort is to be made to provide accommodations for all visitors, suitable to their respective tastes and pocketbooks. Safe travel is to be provided for over suitable roads and trails. Through proper sanitation the health of the individual and of the changing community is always to be protected.

10. Roads, buildings, and other structures necessary for park administration and for public use and comfort should intrude upon the landscape or conflict with it only to the absolute minimum.

11. The national parks are essentially noncommercial in character and no utilitarian activity should exist therein except as essential to the care and comfort of park visitors.

12. The welfare of the public and the best interests of park visitors will be conserved by protective permits for utilities created to serve them in transportation, lodging, food, and incidentals.

13. The national interest should be held supreme in the national-park areas and encroachments conflicting therewith for local or individual benefit should not be permitted.

14. Private ownership or lease of land within a national park constitutes an undesirable encroachment, setting up exclusive benefits for the individual as against the common enjoyment by all, and is contrary to the fundamental purposes of such parks.

15. National parks, established for the permanent preservation of areas and objects of national interest, are intended to exist forever. When, under the general circumstances such action is feasible, even though special conditions require the continuance of limited commercial activities or of limited encroachments for local or individual benefit, an area of national-park caliber should be accorded that status now, rather than to abandon it permanently to full commercial exploitation and probable destruction of its sources of national interest. Permanent objectives highly important may thus be accomplished and the compromises, undesired in principle but not greatly destructive in effect, may later be eliminated as occasion for their continuance passes.

16. In a national park the national laws and regulations should be enforced by a national tribunal. Therefore, exclusive jurisdiction of the Federal Government is important.

17. National monuments, under jurisdiction of the Department of the Interior, established to preserve historic landmarks, historic and prehistoric structures, and other objects of scientific or historical interest, do not relate primarily to scenery and differ in extent of interest and importance from national parks, but the principles herein set forth should, so far as applicable, govern them.

NEW NATIONAL-PARK LITERATURE

The year has brought us many new books on the national parks and national monuments. Space permits mention of only a few of these valuable works.

The Civic Annual, Volume IV, of the American Civic Association, really the 1932 yearbook on Parks and Planning, features important phases of National Park Service activities both in Washington and the field. If one would keep up to date on every important subject directly or indirectly related to park protection and administration, he should have the new Annual at hand. The book is published for

the Civic Association by the J. Horace McFarland Co., of Harrisburg, Pa.

The Stanford University Press, which already had a large list of national-park books, added to it this year by publishing two volumes on Yosemite National Park.

The first was Dr. Carl Russell's 100 Years in Yosemite, the first complete history of this great park. It is a fascinating account of the discovery of the region, its early settlers and visitors, and the development of facilities for seeing and enjoying its lovely natural features.

The other Stanford Press book is Trees of Yosemite. This book contains exceptionally well-written descriptions of Yosemite's trees by Mary Curry Tresidder, and it is illustrated by 34 linoleum block prints by Della Taylor Hoss. Both the author and artist are talented women who live in the Yosemite Valley, and devote much time to study of the trees and flowers.

Another book soon to come from the Stanford Press is a new edition of Chittenden's Yellowstone National Park, revised and brought up to date by Isabelle F. Story, editor of the National Park Service.

In the Shadow of Mount McKinley is a new book on our farthest north park and its surrounding wilderness country in Alaska, by William N. Beach. It is a profusely illustrated account of the author's many explorations in and around Mount McKinley, including interesting and thrilling experiences in hunting big game. The book is beautifully printed, in limited edition at \$12 per volume, by the Derrydale Press, New York. It is a very valuable addition to the literature of Mount McKinley National Park.

Scout Naturalists in the Rocky Mountains, by three Eagle Scouts who visited many parks and monuments in 1930, is a new book from the press of Brewer, Warren & Putnam. It is mentioned elsewhere in this report. It is a book of real adventures by boys in a new field of activity—assisting in scientific work while enjoying a grand vacation.

Adding to his publications on Grand Teton National Park, Dr. Fritiof Fryxell, former naturalist in the National Park Service, has published this year The Teton Peaks and Their Ascents, a carefully revised collection of his mountain-climbing articles which have heretofore appeared in Appalachia. Doctor Fryxell is the authority on the geology and exploration of the Teton Range, and his writings are very valuable both to Grand Teton Park officers and the visiting public. The new book is from the Augustana Book Concern, Rock Island, Ill.

A fine book which recently came off the press is the one by Robert Frothingham entitled "Trails Through the Golden West," published by Robert M. McBride & Co. of New York. This book gives an outstanding presentation of the numerous units of our park system, covering the southwestern monuments particularly well. The chapter dealing with wild animals in Yellowstone and the account of the days the author spent with John Wetherill make especially fine reading.

Yorktown, 1781, by Col. H. L. Landers, F. S., historical section, Army War College, a book of 219 pages on the Virginia campaign and the blockade and siege of Yorktown, 1781, including a brief narrative of the French participation in the Revolution prior to the southern campaign, was printed by the Government Printing Office late in 1931.

This book, known as Senate Document No. 273, is one of the most authoritative works on the subject.

A valuable addition to our collection of Wakefield material is the work by Charles Arthur Hoppin entitled "The Washington Ancestry and Records of the McClain, Johnson, and Forty Other Colonial American Families," in three magnificent volumes which were privately printed at Greenfield, Ohio, in 1932. Volume I deals with the genealogy of the Washington family and is a most voluminous and authoritative work, going into the British ancestry of George Washington more than does anything else published along this line. Mr. Hoppin spent 17 years compiling the material contained in these volumes.

Several new Government publications relating to our territory and interests appeared during the year. A Geological Survey work, *The Kaiparowits Region, a Geographic and Geologic Reconnaissance of Parts of Utah and Arizona*, by Herbert E. Gregory and Raymond C. Moore, gives us a remarkable historical and scientific account of a part of the Southwest in which we have several parks and monuments. Bryce Canyon National Park received the special consideration of the authors, and thus their treatise becomes a basic reference work for our naturalist staff. The book is for sale by the Superintendent of Documents, Washington, D. C., at \$1.05.

Our own booklet, *Research and Education in the National Parks*, by Assistant Director Harold C. Bryant and Wallace W. Atwood, jr., appeared during the summer, and has received much favorable mention. It is a record of the growth and present scope of our activities in a special field of education and research.

COOPERATION OF OUTSIDE AGENCIES

Throughout the year the National Park Service has had the finest support from associations interested in our work. The American Civic Association, which played such an important part in the creation of the Service, carefully studied problems of planning and legislation and gave advice on general policies governing national parks and monuments. The association devoted much space in *Civic Comment* and the *Civic Annual* to discussions of national-park affairs. Taking advantage of opportunities afforded its officers in arranging for the recent conference on parks, planning, and government, the Civic Association featured National Park Service activities in programs and after-conference trips.

The National Parks Association devoted its annual meeting and its dinner program on May 9 to national-park matters, and at the dinner brought together a group of distinguished men and women very influential in public life in Washington. The National Parks Association also detailed a committee of Messrs. Frederick Law Olmsted and William P. Wharton to visit the proposed Everglades National Park and report on its natural features. Their report, a remarkable presentation favoring the project, was printed as a Senate document.

Other cooperating associations rendering valuable aid outside of Government circles were the American Game Protective Association, the American Forestry Association, the American Nature Association, the Smoky Mountains Hiking Club, the Sierra Club, and the Potomac Appalachian Trail Club.

CANADIAN-UNITED STATES INTERNATIONAL PEACE RESERVES

The establishment of the Waterton-Glacier International Peace Park and the International Peace Garden in the Turtle Mountain region of North Dakota and Manitoba marked a step forward in international relations. The purpose of these reserves is to commemorate the century-long relationship of peace and good will existing between the peoples and the governments of the two countries.

The Waterton-Glacier International Peace Park was dedicated June 18, 1932, at Glacier Park, Mont., with First Assistant Secretary Joseph M. Dixon representing Secretary Wilbur, and Superintendent Scoyen, of Glacier National Park, representing the National Park Service. Brig. Gen. J. S. Stewart was the representative of the Dominion of Canada.

The idea for the establishment of the international peace park originally developed by Canon Middleton, of Cardston, Canada, was given impetus at the first annual meeting of the Rotary Clubs of Montana and Alberta, in session at the Prince of Wales Hotel in Waterton Lakes Park July 4, 1931. After this meeting, bills for the establishment of the peace park were introduced in the legislative bodies of the two countries and were approved. Under the provision of the enabling legislation, President Hoover issued a proclamation declaring the Waterton-Glacier International Peace Park established. At the dedication the following message from the President was read by Secretary Dixon:

The dedication of the Waterton-Glacier International Peace Park is a further gesture of the good will that has so long blessed our relations with our Canadian neighbors, and I am gratified by the hope and the faith that it will forever be an appropriate symbol of permanent peace and friendship.

For purposes of administration the component parts of the peace park each retains its nationality and individuality, but together they form one great international peace park for the use of the peoples of the two countries.

The International Peace Garden, located in the Turtle Mountain region of North Dakota and the adjoining Canadian Province of Manitoba, was dedicated on July 14 in the presence of a group of prominent citizens of the two countries.

The movement for a peace garden was started at a meeting of the National Association of Gardeners of the United States held at Toronto on August 7, 1929. The suggestion came from a leading Canadian horticulturist that such a garden be established to commemorate the more than a century of cordial relations that have existed between the United States and Canada. The Canadian Florists' and Gardeners' Association sponsored the movement for Canada.

After intensive study of the various areas suggested as the site for the peace garden, the Turtle Mountain area was selected. Located near the geographic center of North America, it is far from commercial centers yet readily accessible to the peoples of the two countries.

The Peace Garden has an area of more than 3,000 acres, of which 1,555 were assigned for the project by the State of North Dakota and 1,452 acres by the Province of Manitoba. The International Peace Garden Association plans to finance the garden entirely by

private subscription, and hopes to raise \$5,000,000 for the project, of which \$4,000,000 will be set aside as an endowment fund to provide for the upkeep of the area. It is understood that eminent landscape gardeners on both sides of the international boundary have volunteered their services in laying out the garden.

SCOUT NATURALIST EXPEDITIONS

During the past several years Senior Park Naturalist Ansel F. Hall has personally organized and sent into the various national parks groups of specially qualified young men, selected from among the ranks of Eagle Scouts, to work on specific projects under careful scientific direction.

The fourth scout naturalist expedition, composed of 11 Eagle Scouts and 3 leaders, spent the greater part of the summer of 1932 in the High Sierra of Yosemite National Park, working under the scientific leadership of François E. Matthes, of the Geological Survey. Mr. Matthes extended his geologic studies into Matterhorn and Virginia Canyons and the region near Mount Conness north of the Toulumne River and also continued his geologic reconnaissance in the Minarets-Devils Postpile region southeast of the park.

Members of former scout naturalist expeditions are especially active in lecturing on national parks. During four months in the winter of 1931-32, 9 lads reported 30 illustrated lectures to audiences totaling 2,829—mostly Service groups or scouting groups. It is believed that the lectures reported represented only about half of those actually given.

A new book, just off the press of Brewer, Warren & Putnam, entitled "Scout Naturalists in the Rocky Mountains," tells the fascinating story of the adventures and achievements of the second scout naturalist expedition which covered many national parks and monuments in 1930.

Due to lack of funds, the Eagle Scout Trail project in Glacier National Park had to be suspended this year, but it must be renewed as soon as possible. Boy Scout parties camped in most of the national parks during the summer.

ASCENT OF MOUNT McKINLEY

One of the great ascents of mountain-climbing history took place in Mount McKinley National Park last spring when a party that included two members of the park staff climbed both the north and south peaks of Mount McKinley, the highest mountain in North America.

The climbing party was composed of Alfred D. Lindley, an attorney of Minneapolis, Minn.; Harry J. Liek, park superintendent; Erling Strom, a Norwegian for many years associated with the skiing activities at Lake Placid, N. Y.; and Grant Pearson, park ranger. These men made up the first expedition ever to climb both peaks, and they were the first men to stand on the south peak since it was climbed by the Stuck-Karstens expedition 19 years before.

FIND THERMOMETER LEFT BY STUCK'S PARTY

At Browne's Tower at 15,000 feet the party found the thermometer left by the Stuck-Karstens expedition 19 years ago. After being photographed the thermometer was removed from its case and examined.

Previous speculations as to what the thermometer would register were all wrong, even the most daring guess of 80° below zero. The minimum reading on the instrument was 95° below zero, and the indicator was as far down in the bulb as it could go. So the actual temperature was below that point, and the position of the indicator appeared to point to a temperature of at least 100° below zero.

CARPE-KOVEN TRAGEDY DISCOVERED

Jubilant over the success of their expedition, the party started down the great mountain.

The elation of the party at the success of their efforts vanished, however, when on their way down the mountain they discovered the tragedy which terminated the Carpe-Koven expedition camped on Muldrow Glacier for the twofold purpose of making scientific observations relating to cosmic rays and climbing the mountain.

After finding the tents of the cosmic ray party empty, a search was made, and the body of Theodore Koven was found lying in the snow on the top of a high serrac.

Search was then begun for Allen Carpe, leader of the expedition. Signs at the edge of a crevasse indicated clearly that he had fallen in, but his body was not located. From signs in the snow it appeared that Carpe and Koven had come skiing down without being roped together. Snow covered the crevasses, making them invisible, and Carpe must have plunged into one. The tracks showed that Koven had skied up to the edge of the crevasse in an effort to locate his companion, and had himself fallen in. Although badly injured he had managed to climb out, but had died apparently from the combined effects of his injuries and the intense cold.

Attempts were made to bring the body out on a sled, but when one member of the party nearly lost his life, it was realized that the project must be abandoned temporarily if the members of the Lindley-Liek party were to return safely. Koven's body then was rolled in a pup tent, covered with snow, and the sled placed on end as a marker.

The party then worked its way over the crevasses which honey-combed the region, different members falling into them many times. Fortunately enough retained their footing each time to rescue the person in distress. When Carpe's lower camp was reached, E. P. Beckwith and Percy T. Olton, jr., were encountered, the former very ill. N. W. Spadevecchia, the fifth member of the cosmic ray party, had left camp a few days earlier in an effort to reach the Park Service telephone at Mount Eielson and summon an airplane to take the sick man to Fairbanks.

During this time, for a period of 40 hours, the Lindley-Liek party had had but one meal. After food and a brief rest they pushed on to park headquarters and summoned a plane to go to Beckwith's aid. Searching parties from headquarters and aviators from Fairbanks were organized to hunt for the missing Spadevecchia. Jerry Jones, Joe Crosson, and S. E. Robbins, crack Alaskan fliers, aided in the

rescue of Beckwith and the search for Spadevecchia, who returned to camp shortly after the tragedy.

Up to the present time Carpe's body has not been recovered. Koven's body was brought back to his home in New Jersey for burial late this summer by Merle La Voy, of the Explorer's Club of New York, who had previously had experience in climbing in McKinley Park. Ranger Pearson guided the party which brought it out.

Everything that could possibly be done by the McKinley Park staff to help surviving members of the Carpe expedition and their anxious relatives, as well as the families of Carpe and Koven, was done. Offers of help came from many sources, and much credit is due the fearless Alaskan pilots who risked their lives flying near the great mountain to bring in supplies and make the intensive search for Spadevecchia.

Before he left for Alaska Mr. Carpe made a special trip to Washington to talk over his plans with me. He and his companions were men of the highest caliber, with enviable records as mountain climbers, and the tragic termination of their expedition, through no fault of theirs but rather through a queer twist of fate, was a shock to everyone familiar with their outstanding ability.

It should be recalled here that the notorious Dr. Frederick A. Cook, before his North Pole adventure and exposure occurred, claimed that he climbed Mount McKinley with a companion, Edward Barille. This was in 1906, and his alleged exploits were reported in his book, *To the Top of the Continent*, in 1908. Not satisfied with his tale, four "sourdoughs" in 1910 attempted the ascent of the great peak, and two of them, Taylor and Anderson, reached the north and lower of the two summit peaks. In 1912 the Parker-Browne party, after elaborate preparations, attempted to scale Mount McKinley, and did get within a few hundred feet of the summit of the south and higher peak (20,300 feet). Their story was published in *The Conquest of Mount McKinley*, by Dr. Herschel Parker and Belmore Browne, the leaders of the expedition. They completely disproved Doctor Cook's claims. In 1913 Archdeacon Hudson Stuck and three associates, including former park superintendent Harry Karstens, of Mount McKinley, climbed the mountain, reaching the south peak. This was June 7, 1913, and they were undeniably the first to reach this great goal.

This brief account of the ascents of Mount McKinley does not include early attempts, the first of which occurred in 1902, one party being led by Judge James Wickersham, now Alaska's Delegate to Congress, and the other by Dr. Frederick A. Cook.

WINTER USE

New and better highways and up-to-date machinery for snow removal are constantly proving that the public has a keen interest in the national parks and monuments in the winter. It becomes increasingly apparent that future plans for the development of these areas must give adequate attention to serving the large numbers of winter travelers who wish to include the national parks and monuments in their itineraries.

Last winter excellent weather conditions brought the largest number of winter visitors ever recorded in Yosemite National Park,

and accommodations were often taxed to the limit. During the week-end including Washington's Birthday, 5,441 persons entered the park and an acute housing problem was created. It is rather astonishing to note that the 1932 winter travel count was 75,072, a greater number by nearly 7,000 than entered the park during the entire year of 1920.

The second annual winter carnival of the San Joaquin Valley, attended by nearly 3,000 persons, was held in Yosemite on January 10 and 11. The Governor of California was present and the event was featured in winter sports news reels throughout the country. On January 23 the third annual speed skating races were held.

In Sequoia and General Grant National Parks, two places in California where road conditions always permit winter visitors from outside the State to see the Big Trees, winter travel decreased slightly from that for the preceding year because of general conditions and the severest winter in many years. When the weather was favorable, visitors flocked in for winter sports, and on January 17 the Sequoia record for one-day travel in winter was broken when more than 2,000 persons entered the park. These national parks in the High Sierra country provide unexcelled opportunities for skiing, and there was a decided tendency toward such trips into the more remote sections of the parks.

Winter travel to Mount Rainier National Park showed a 3 per cent decrease for the season. That this was due to unfavorable weather conditions which developed late in the winter is indicated by the fact that travel for January, 1932, showed a 9 per cent increase over that for 1931.

In spite of stormy weather late in January more than 1,000 persons attended the Tacoma Day Winter Carnival at Longmire on January 31, when ski and snowshoe races, tobogganing, and other snow sports made up the day's program. This carnival was sponsored by the Tacoma Chamber of Commerce and other local civic organizations. Another important winter sports event took place in Mount Rainier on April 3 when the first annual snow carnival of the Seattle Junior Chamber of Commerce was held at Paradise Valley. So successful was this affair that the Senior Chamber of Commerce of Seattle voted to support the junior chamber in making a snow carnival in Mount Rainier an annual activity of the organization.

Though not listed as an all-year park, the policy at Crater Lake has been to keep roads to the lake rim open as late as possible in the fall and get them cleared as early as possible in spring. The Crater Lake Ski Club carnival, an annual event at Fort Klamath, with Crater Lake Lodge as the terminus for ski races, brought much travel to the park during February.

Public interest in winter sports at Rocky Mountain National Park continues to increase. During the period from October 1, 1931, to March 31, 1932, travel was 21 per cent heavier than during a similar period for the previous year. The Rocky Mountain National Park Ski Club held a tournament near Estes Park Village on January 10. Two members of this club later participated in the winter sports Olympic events at Lake Placid. The Colorado Mountain Club held its annual winter outing at Fern Lake from February 20 to 27.

In Grand Canyon National Park the season on the north rim is from early spring to late fall, but the south rim is open all year. Here



Copyright by Fred Harvey

NEW REST STATION AND WATCH TOWER BUILT BY FRED HARVEY AT DESERT
VIEW, GRAND CANYON

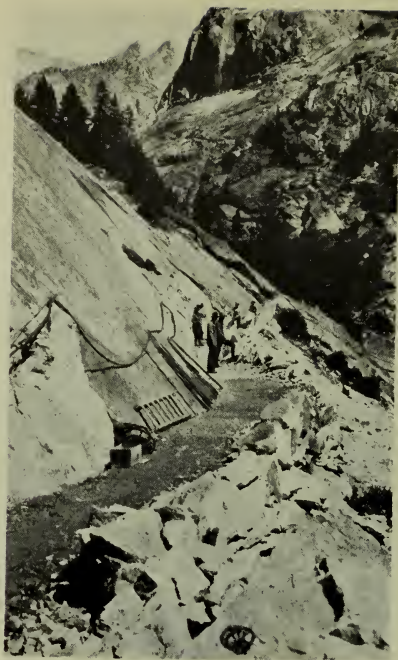
Reproduction of Indian architecture, from painting by Gunnar Widforss.



REST STATION AT LOGAN PASS ON TRANSMOUNTAIN HIGHWAY, GLACIER
NATIONAL PARK



Moro Rock Stairway



Construction on High Sierra Trail

SEQUOIA NATIONAL PARK



NEW ROAD ON FLOOR OF ZION CANYON, ZION NATIONAL PARK

winter travel suffered a noticeable decrease, but severe weather is believed to have played as large a part in this as unfavorable economic conditions. Road improvements which are now under way in that section of the Southwest will undoubtedly bring a great increase in winter travel to the Grand Canyon in the next few years.

Hot Springs National Park, which enjoys a mild climate throughout the winter, experienced an increase in winter travel. This was probably due to increased efforts of business organizations in its vicinity to stimulate public interest in that section of Arkansas.

Hawaii National Park experienced a normal increase in winter travel in spite of poor business conditions. Approximately 80,000 people visited the park during the winter season this year as compared with approximately 76,000 for last year. The visit of the fleet to the Hawaiian Islands brought a great many persons to the park, as did the activity in Kilauea Crater last December and January.

Carlsbad Caverns National Park experienced a slight decrease in winter travel, undoubtedly due to the severe winter weather which was experienced in practically all sections of the West.

Though it is not possible at the present stage of its development to make an accurate count of travel in the Great Smoky Mountains National Park, which is open all year, there is much use of the park in winter. During last January many automobiles were observed parked at Newfound Gap. When actual development of this park to receive visitors begins, it will experience heavy out-of-season travel because of its long spring and fall seasons and its nearness to densely populated sections of the country.

Zion, Wind Cave, Platt, and Acadia National Parks are also open throughout the year and experienced normal winter travel.

The George Washington Birthplace and Colonial National Monuments experienced the heavy winter travel that had been forecast for them. This will increase each year as these monuments become better known and are fully developed.

The southwestern monuments, which experience much of their travel in winter, suffered a slight decrease attributable to general conditions during the past winter.

NEW NATIONAL MONUMENTS

Two important national monuments were brought into the system during the year.

Negotiations covering several years were successfully culminated when the Bandelier National Monument, including Rito de Los Frijoles, Otowi, and Tsanhowi cliff-dweller ruins, was transferred from the jurisdiction of the United States Forest Service to that of the National Park Service by proclamation dated February 25, 1932. At the same time the area of the monument was increased from 22,075 acres to 26,026.2 acres by the addition of adjacent national-forest lands.

The Great Sand Dunes in San Luis Valley, Colo., became a national monument by presidential proclamation March 17, 1932. This area of 46,034 acres contains a large number of shifting white sand dunes 400 to 500 feet high, the tallest in the United States.

No new national parks were established.

ADDITIONS MADE TO EXISTING NATIONAL PARKS AND MONUMENTS

The problem of readjusting existing park and monument boundary lines to establish better administrative units, take in additional essential features, better protect existing features, and make the areas more accessible to the public was given a great deal of attention during the year and several important adjustments made.

NATIONAL PARKS

Acadia.—Three hundred acres were tendered the Government by private individuals and accepted for addition to Acadia National Park. The area of this park now is 11,859.32 acres.

Crater Lake.—A small but very important addition of 973 acres was made to this park along the southern boundary at the Annie Creek entrance by act of May 14, 1932, to bring into the park a lovely stand of very large yellow-pine trees which borders both sides of the highway.

Great Smoky Mountains.—On November 2, 1931, the States of North Carolina and Tennessee presented to the United States, through the Secretary of the Interior, deeds covering 138,843.20 acres of land for inclusion in the Great Smoky Mountains National Park, bringing the total number now deeded to the Government within 129,280.30 acres of the 427,000 acres required by law. The deeds are being reviewed by the Attorney General's office.

In North Carolina at this writing there remains to be negotiated for only one tract belonging to the Ravensford Lumber Co. The State of Tennessee has granted additional legislation to condemn, if necessary, areas formerly not included in condemnation legislation within the Tennessee section of the park boundaries, and involving primarily the Elkmont and Cherokee Orchard sections. A few leases have been granted in both States under authority of law by the Secretary of the Interior to old settlers and others where such occupancy will not conflict with development of the park itself.

Mount McKinley.—The act of March 10, 1932, added 246,693 acres to this park and increased its total area to 1,939,493 acres. The eastern boundary now extends to the Nenana River, and the northwest line farther north, bringing Wonder Lake into the park.

Rocky Mountain.—Under authority of the act of June 21, 1930, President Hoover, by proclamation on January 11, 1932, added 3,075 acres in Moraine Park to the Rocky Mountain National Park. Most of the land added was privately owned, but a large part has since been acquired. Several other changes in the boundary line of this park will be necessary before it is finally fixed.

Yosemite.—The Wawona acquisition of 8,784.94 acres will have far-reaching effects during the future years of Yosemite National Park. It adds to the park the superb area along the new Wawona Highway lying between the old park line and the Mariposa Grove, and is the outstanding addition since the acquisition of the sugar-pine forest in 1930.

NATIONAL MONUMENTS

Colonial.—The Colonial National Monument has been extended by purchase of private lands and transfer of Government-owned lands from the Navy mine depot and Navy fuel depot, and now consists of

2,375.69 acres. All the money appropriated by the Federal Government for the purchase of land has been spent and all the Government land transfers have been completed. No further additions can be made until additional funds have been appropriated, with the one possible exception of adding the lands on Jamestown Island, for which the State of Virginia has available \$100,000.

There are many very important purchases within the boundaries of this monument, and when Congress again feels that it can appropriate money for land purchase, it is my hope that they will look with favor on the land needs of this monument.

George Washington Birthplace.—George Washington Birthplace National Monument is now established at its approximate final size, containing 394.47 acres. There are a few minor additions under consideration which are more in the category of protective measures to the present monument, such as a proper approach road from the main highway.

Scotts Bluff.—By presidential proclamation dated June 1, 1932, 1,346 acres were added to the Scotts Bluff National Monument.

Petrified Forest.—On September 23, 1932, the President signed a proclamation adding approximately 53,300 acres to the Petrified Forest National Monument, including the outstanding section of the Painted Desert. The Painted Desert section is connected with the Petrified Forest by a narrow strip of land, 1 mile wide and approximately 6 miles long, to provide a proper road connection. The road also will serve as an entrance to the Petrified Forest area of the monument from transcontinental highway U. S. No. 66 which runs between the Painted Desert and the Petrified Forest. The area added, besides containing the brilliantly colored sands from which it derives its name, also contains the black petrified forest.

ACQUISITION OF PRIVATE LANDS

A definite program for eliminating alienated lands within national parks and national monuments was worked out during the year and excellent progress made in assembling the necessary preliminary data.

No funds were carried in the 1933 appropriation act for the purchase of private lands. Several transfers were completed, however, from money previously appropriated and also under exchange acts and by gift. Alienated lands acquired during the year from all sources amounted to 21,065.29 acres.

The total expenditure of Government funds during the year for the purchase of lands was \$668,708.85, of which \$109,205 were 100 per cent funds and \$559,503.85 were 50 per cent money. The 50 per cent money was matched by private donations. The acquisitions were as follows:

Glacier.—Two thousand five hundred sixteen and thirty-two hundredths acres by purchase at a total cost to the Government of \$202,002.85, of which sum \$8,730 was from 100 per cent funds.

Rocky Mountain.—Four thousand two hundred thirty-seven and seventeen hundredths acres by purchase with expenditure of \$411,231. The 100 per cent funds expended amounted to \$66,125 and the balance of \$345,106 was 50 per cent money.

Wind Cave.—One hundred and seventy-seven hundredths acres were purchased with special appropriation of \$9,500.

Yosemite.—Six hundred and forty acres by donation.

Zion.—Six hundred seventy-nine and fifteen hundredths acres by purchase at cost of \$45,970, of which \$24,845 was from 100 per cent funds.

Petrified Forest.—Twelve thousand seven hundred ninety-two and eighty hundredths acres under the land exchange law authorizing the selection of lands on the public domain in lieu of privately owned lands within the monument.

PENDING BOUNDARY PROBLEMS

All proposed national park and monument boundary adjustments involving national-forest lands were taken up with the Chief Forester, United States Forest Service, during the year, and in many instances were referred by him to his field officials. Reports received show that additional study and adjustments will be necessary before some of the proposed extensions can be accomplished.

In Carlsbad Caverns field studies were made by Park Service officials. The Forest Service agreed to transfer part of Lincoln National Forest if necessary to round out the park. It is hoped to recommend definite boundary adjustment in the near future.

The Diamond Lake extension is important in the future development of Crater Lake National Park, but no agreement on this has yet been reached with the Forest Service. Small additions to the south for the purpose of controlling properly the entrance to General Grant Park and to the west for administrative purposes are urgently needed.

Grand Canyon.—A section of the Kaibab area to the north should be added to give better protection to that part of the Kaibab deer herd that winters on park land. This involves a national-forest transfer upon which no agreement has been reached. The Tusayan extension to the south, also to protect wild animals, has been partially agreed to by the Forest Service, but a definite boundary line has not yet been worked out.

Grand Teton.—Conditions surrounding the proposed addition to this park have changed little since my last annual report.

Rocky Mountain.—Further boundary extensions in the vicinity of Estes Park and in the Colorado River watershed are important properly to develop and protect park approaches. The proposed Arapaho extension to the south has been generally agreed upon by the Forest Service and field studies to determine the exact boundary line are now in progress.

Sequoia.—In 1926 partial extension of Sequoia National Park to include the upper Kern and Kaweah watersheds was made, but nothing has been accomplished in connection with the Mineral King area, the Redwood Canyon, with the finest stand of *Sequoia gigantea* outside a national park, and the Kings River Canyon. The extension of Sequoia National Park or the establishment of a separate park to include the latter region was a project very near to the hearts of John Muir and Stephen T. Mather, but conflicting interests have as yet made it impracticable to give national-park status to this region. It has been possible to postpone action as long as this section of the Sierra was undeveloped by roads, but recent and prospective construction will soon compel action in one direction or the other, as large numbers of visitors will soon be able to enter Kings Canyon.

Yellowstone.—The final report of the Yellowstone National Park Boundary Commission is still before Congress.

Yosemite.—The proposed Minarets addition includes the Devils Postpile National Monument now under the jurisdiction of the Forest Service.

INVESTIGATION OF PROPOSED PARKS AND MONUMENTS

At the time of my last year's report there were 44 proposed national parks and 55 proposed national monuments on our docket for investigation. As previously mentioned, three monument projects were favorably acted upon during the year. However, 13 additional park projects and 16 additional monument projects have been added to the list for consideration, making 57 park and 68 monument projects now on the docket. Twenty-three of the proposed parks and 21 proposed monument projects have been investigated. During the past year Supt. Roger W. Toll, who has acted as chief investigator, inspected and reported on 7 proposed national parks and 10 proposed national monuments. During this coming year a concentrated effort will be made to reach definite decisions on proposed parks and monuments which have been investigated. There still remain 34 proposed national parks and 47 proposed national monuments that have not received a field investigation.

Superintendent Toll made two main inspection trips, one to the west coast to examine the Lake Tahoe region, the coastal redwood area, and the lava beds, all in California; Pyramid Lake and the Comstock Lode in Nevada; and the Oregon Caves in the State of Oregon. The second trip was to the Southwest for the purpose of studying the white-sands area in New Mexico, the extension proposed for Carlsbad Caverns National Park, the suggested Guadalupe Mountains Park in Texas, and the Painted Desert area proposed for addition to the Petrified Forest National Monument. This latter addition was formally made on September 23.

While on this Southwest inspection trip, Superintendent Toll also visited several areas of unusual cactus growths with a view to recommending one as a national park. Though no decision has yet been reached, the Service is convinced that a decision should be made in the near future if any of the great native cactus stands are to be preserved, as they now are rapidly disappearing.

It is my plan to start a complete study of the sites on which events of national historic interest have taken place in an effort to ultimately set up a system of national historic monuments. No doubt many of these sites at the present time are either privately owned or managed by historic societies, but it is my belief that areas which have an important national historic significance should be properly protected and administered, and if a good comprehensive system is programmed, I feel that many of the historic societies and individual interests will be willing to join the Federal Government in an effort to protect such a system.

AUTHORIZED PARK AND MONUMENT PROJECTS

There has been little change from last year in the status of the national-park projects authorized by acts of Congress, although each project has materially progressed.

Congress authorized an acreage for the Shenandoah National Park project on February 4, 1932, of 160,000 acres, and cooperative study between the National Park Service and the Virginia Commission on Conservation and Development, which has the acquisition of this project in charge for the State, has resulted in the establishment of such a line acceptable to the Department that incloses 176,710 acres.

The State has sufficient funds to acquire this acreage and is ready to take steps for its prompt acquisition. Under the applicable State laws, every acre within the park boundaries must be condemned, but it is believed that through this process the land will have been acquired and tendered to the United States for acceptance during the coming calendar year. Already 42 miles of mountain parkway have been constructed through the heart of the area lying on the crest of the ridge between the Lee Highway and the Spottswood Trail, as a drought-relief measure under authority of Congress, and will be finally completed by early spring.

The Mammoth Cave National Park project, covering a minimum area of 45,310 acres and including all the caves lying within the proposed boundary is making excellent progress. Approximately two-thirds of the land has been acquired by purchase, and the two major caves of a total of five important caves; also practically all land at strategic locations, particularly along the banks of the Green and Nolin Rivers. Both the Kentucky National Park Commission and the Mammoth Cave National Park Association are busily engaged in acquiring the additional needed lands, and it is believed that the coming year will see substantial progress in the acquisition of the yet unacquired lands and caves.

The commission appointed by Governor Brucker, of Michigan, to acquire Isle Royale as a national park, under existing act of Congress, has organized its facilities and gathered all data necessary to proceed at the proper time with its program of acquisition, including gathering of funds therefor. The membership of the commission, comprising some of the most eminent and outstanding men of Michigan, assures the eventual completion of the project.

EVERGLADES PROJECT

The Everglades project has not changed. Although it has received your approval, the establishment of the park has not been authorized by Congress. It is hoped that it will be brought up for consideration and receive favorable action in the coming short session of Congress. The Fletcher-Owen bill authorizing the Everglades National Park passed the Senate on January 19, 1932, but, although the measure was favorably reported by the Public Lands Committee, it did not receive attention in the House of Representatives in the last session of Congress. It stands high on the House Calendar for action this coming winter.

PROGRESS IN EDUCATION AND RESEARCH

Excellent progress was made in educational and research developments during the past year. Naturalist service was extended to Acadia and Carlsbad Caverns National Parks and was expanded in other areas. Especial emphasis was placed upon the importance of

stressing, in public contacts, principles involving ecological relationships and conservation viewpoints. There was a notable increase in public interest in the educational aspects of park work.

ADVISORY BOARD CONTINUES ASSISTANCE

The Educational Advisory Board continued to give helpful advice relative to the solution of various educational problems. A meeting held February 29, 1932, was devoted to discussions relative to visual education, the use of native Indians to show craft work, innovations in museum display, and opportunities in various parks for developing educational programs. At this meeting approval was given to a plan to appoint a subcommittee, made up of members of the American Historical Association, to aid in studying the historical developments of the national parks.

POPULARITY OF TRIPS AFIELD AND OF CAMP-FIRE LECTURES

Public interest in longer trail trips, especially all-day hikes, showed a decided increase. In Yosemite National Park about twice as many people took these trips as during the previous year. In Rocky Mountain Park an all-day trip inaugurated on Saturdays became so popular that it was necessary to divide the group into several sections.

New types of field trips inaugurated included providing a ranger naturalist to accompany privately operated airplane flights over the Grand Canyon, a sunrise morning trip over the hot springs formations at Mammoth Hot Springs and an evening automobile game-stalk caravan in the Yellowstone, a sunrise breakfast caravan to Cadillac Mountain in Acadia, and in the same park a ranger naturalist accompanied privately organized deep-sea fishing trips. Automobile caravans of various types are now conducted in all the major national parks.

The lecture program was expanded primarily in the direction of informal camp fires in the various auto camp grounds. In one park the term "Nature stories at the camp fire" was used instead of lecture. As an example of the popularity of this service, at the three camp fires in Sequoia National Park about 1,500 people gathered nightly.

MUSEUM EXPANSION

The main museum developments of the year were the opening to visitors of the fine new exhibit rooms at headquarters of Petrified Forest National Monument and Casa Grande National Monument. The Sinnott Memorial at Crater Lake, active supervision of which has been under Dr. John C. Merriam, president of the Carnegie Institution of Washington, was opened to the public. The placing of the exhibits in the Fishing Bridge Museum are nearing completion, and this will mean the completion of the series of trailside museums planned for Yellowstone National Park, made possible by the support of the Rockefeller Foundation through the American Association of Museums. Credit is due Dr. H. C. Bumpus for the fine supervision he has given to this major museum development in Yellowstone.

At the Colonial National Monument, the historic Moore House, in which were drawn up the articles of capitulation after the Battle of Yorktown, is now a museum.

The MacCurdy Wayside Museum of Archeology, situated near Lipan Point in the Grand Canyon, was opened to the public. Mr. Gladwin, of the Gila pueblo, aided greatly in the preparation of exhibits. This museum acts as an index to the excavated Tusayan pueblo ruin located near by.

WILD FLOWER DISPLAYS

There is an increasing tendency in the parks to abandon cut-flower exhibits and to construct instead a permanent botanic garden so that the visitor may view a plant actually growing in a normal setting. Especially interesting is the extensive development back of the Yosemite Museum, made possible through the gift of Miss Marjorie Montgomery Ward. An artificial stream of water and reflection pool has been developed, and around this has been started a dual display in the form of a set of plant communities and a grouping showing flower relationships. This plan was worked out after suggestions made by Dr. Frederic E. Clements, well-known ecologist of the Carnegie Institution.

NATURALIST LEAFLETS

A new development that has been found very helpful in several parks is the issuance of a mimeographed leaflet listing the entire activities of the naturalist service for the ensuing week. A copy is given each visitor so that he may plan his stay to better advantage.

UNIVERSITY FIELD CLASSES

It is a pleasure to report continued use of the national parks and monuments by university field classes, particularly in ecology and geology. Princeton, Harvard, and Clark Universities conducted their usual geological field school tours in several of the parks, and groups from Drake, Smith, Oklahoma, and North Carolina also visited these areas. The Omnibus College, of Wichita, Kans., again based its itinerary on the national parks. The Hawaiian National Park Summer School, the summer field course of the University of Hawaii, was a cooperative project, the park naturalist staff furnishing a large part of the field instruction. The Archeological Institute of America continued research activities in Chaco Canyon National Monument.

YOSEMITE SCHOOL OF FIELD NATURAL HISTORY

The Yosemite School of Field Natural History, the training school of the National Park Service, held its eighth session. The 20 picked students hailed from 8 different States. Scientists from the University of California donated their services as instructors. One graduate of the 1931 class of the Yosemite Field School was placed in charge of the new educational work in Acadia National Park and two other graduates of last year served as ranger naturalists in Glacier National Park.

LIBRARIES

With the help of an active committee of the American Library Association, librarians throughout the country became interested in the development of park libraries and donated a considerable amount of

material. This was segregated at field headquarters in Berkeley and distributed to park libraries to the best advantage. A small amount of material also was purchased with available funds.

SCIENTIFIC RESEARCH

A number of interesting scientific studies were made in the national parks and national monuments during the past year. Dr. Arthur E. Compton of the University of Chicago, selected points in Mount McKinley and Hawaii National Parks in which to make observations in connection with his recent world-wide program for conducting cosmic ray investigations. The Hawaii field laboratory was established on the summit of Haleakala, and that in McKinley Park on Muldrow Glacier at an 11,000-foot elevation. Observations at the latter point were made by Allen Carpe and Theodore Koven before they met with their fatal accident on the glacier early in May. Every possible assistance in freighting in equipment, making preliminary local arrangements, giving information, and providing guide service was furnished by the park staffs to these two important expeditions.

Various Government bureaus and agencies have continued to aid in the solution of technical park problems, as have other scientific organizations. Dr. A. P. Meinecke, of the Bureau of Plant Industry, Department of Agriculture, studied forest conditions in Hawaii National Park. Dr. A. S. Hazard, of the Bureau of Fisheries, made stream and lake surveys in Glacier National Park, and Lowell Woodbury of the same bureau continued his studies of parasites of fish. Inspections and surveys relative to plant diseases were made by the Bureau of Plant Industry and insect attacks were studied by the Bureau of Entomology. Drs. Edwin B. Copeland, and Carlton R. Ball, and Miss Elizabeth Morse, all of the botany department of the University of California, studied the flora of Lassen Volcanic National Park.

Dr. John C. Merriam, president of the Carnegie Institution, continued his studies of methods of presenting esthetic and scientific park features to the public, and several other investigations were undertaken by the investigators of the institution. Dr. H. C. Bum-pus, of the American Association of Museums, continued his study of trailside museum problems. The Smithsonian Institution, including the United States National Museum, rendered valuable assistance on various scientific matters. Dr. R. M. Field, of Princeton University, with a group of students has continued studies of the geology east of Yellowstone National Park and plans to carry correlations into the park, thus definitely establishing the geologic section. Dr. Allen D. Hole, of Earlham College, made geological studies in several parks in company with a group of students. Studies of the granites of Yosemite were continued by Dr. Ernst A. Cloos and Dr. A. E. Douglass, of the University of Arizona, continued his tree-ring studies in Sequoia and some of the Southwest monuments. Dr. W. A. Setchell, of the University of California, continued his study of the flora of Mount McKinley National Park, and Dr. F. M. Fryxell published an account of the geology of Grand Teton National Park. Dr. A. M. Camp, of Ohio State University, studied the ecology of the heath family in many of the national parks. E. V. Komarek, mammalogist of the Chicago

Academy of Sciences, continued his preliminary study of the vertebrate fauna of the Great Smoky Mountains National Park region.

Several investigations and studies of wild life conditions also were made, and these are covered under the following section on the park animals.

ANIMAL CONDITIONS

More than ever, the National Park Service is watching over and scientifically protecting the animal life in its charge.

Wild-life conditions in the national parks continued favorable throughout the year. In spite of the heavy winter, elk and other game in Yellowstone and deer in the western parks came through with minor losses. Grand Teton National Park reported some losses of moose, apparently the result of disease, but no serious outbreaks of disease developed anywhere. The most serious condition reported was the reduction of mountain sheep in Mount McKinley National Park as a result of the severe winter.

An airplane census of the southern elk herd, which winters in Jackson Hole, was made by the Forest Service, and showed the herd to be larger than heretofore reported. A committee from the Campfire Club of America, consisting of two of its great conservationists, W. B. Greeley and Otto Van Norden, made investigations of game conditions in Wyoming during the past summer, and already an excellent report on the elk problem has been filed by these keen observers.

The situation regarding mule deer on the Kaibab Plateau, adjacent to the Grand Canyon National Park, continues precarious. A Park Service employee crossing the plateau at sundown on July 27 recorded only 57 deer seen, in contrast to the 700 or 1,000 actually counted in former years. Officials in charge admit that the stock of deer now is at low ebb. This year only the west side of the Kaibab Forest will be open to hunting and it is hoped that the toll of deer taken by hunters will be small.

As a result of the artificial feeding of bears in the Yellowstone, personal and property damage by black bears has created an intolerable situation. Already control of guilty bears has been undertaken and further changes in policy will be adopted if necessary.

WILD-LIFE SURVEY

The wild-life survey, gathering scientific information on the most pressing animal problems, was continued in 1932 with the National Park Service bearing nearly half the expenses of the survey. During the first two years of the work all expenses were borne privately, an outstanding example of unselfish desire to be of real aid in work of foremost importance. Studies during the past year involved bird and mammal studies in Mount McKinley and investigations relating to the trumpeter swan, pelican, bear, and other animal problems in the Yellowstone. A preliminary report of the wild-life survey is now in press. The staff is composed of Field Naturalist George Wright, who has personally financed the survey, Field Naturalist Joseph Dixon, and Ranger Naturalist Ben Thompson.

OTHER ANIMAL INVESTIGATIONS

The cooperative elk survey by William Rush, supported by the Bureau of Biological Survey, Forest Service, Montana Fish and Game

Commission, and the National Park Service, was brought to completion during the year. Mr. Rush's findings have been most helpful in establishing a policy of management of Yellowstone's great game herds. Dr. O. J. Murie, of the Biological Survey, continued his studies of Jackson Hole elk.

FISHING AND FISH-CULTURAL OPERATIONS

A marked improvement in fishing conditions was noted, with a resultant larger catch per capita of visitors than previously reported. Yellowstone and Glacier National Parks in particular were among the Nation's foremost fishing grounds.

Fish-cultural activities made excellent progress during the year. The Bureau of Fisheries of the Department of Commerce continued to cooperate with the National Park Service in fish-cultural activities through the detail of Fred J. Foster, district supervisor of that bureau, to supervise such activities in the western national parks, as well as through making surveys and furnishing large quantities of stock for planting.

Especially important were the biological and physical surveys made of the waters of the Grand Teton and Glacier National Parks, the construction of rearing pools near the former, the construction of the new hatchery near Mount Rainier National Park, and of rearing pools in the park itself, and the completion of the construction work at the lake hatchery in Yellowstone National Park. All of this work was accomplished by the Bureau of Fisheries.

It is especially interesting to note that as a result of previous plants in Bright Angel Creek, in Grand Canyon National Park, fishing in this stream was excellent last year.

State fishing authorities cooperated by supplying trout fingerlings for planting in several parks not supplied by Federal hatcheries.

PRESERVATION OF PARK LANDSCAPE

During the year just ended the landscape architectural division embarked upon the largest scale of future planning yet undertaken.

Important progress was made in the preparation of a master plan for each national park, based on a development outline prepared by the superintendent. These master plans will help the park superintendents to prepare their 6-year advance program in accordance with the employment stabilization act and will assure each park of a well worked out and properly coordinated plan of development. The engineering division supplied a great deal of basic data for these master plans. First editions of the master plans for all but five parks and for some of the monuments have been prepared. These plans show the entire development scheme and include a wide variety of subjects, such as the road and trail systems, fire-control plans, developed and special area plans, general layout of each tourist, parking, and administration area, utilities plans for each community, relocation and arrangement of future buildings, and in some cases, drawings to illustrate a special type of wall, guardrail, or other detail desired at a certain location.

This, of course, is only the beginning of intensive advance study programs and it will take three or four years to build these plans up to their ultimate form.

The landscape division exercised an increasing influence on road location and design, due to the hearty cooperation of the engineers of the Bureau of Public Roads. Considerable study of road sections is now being made and is resulting in the rounding and flattening of cut-slopes treatment, thus decreasing maintenance costs while improving appearances. More serious consideration also is being given to road shoulders, width of slopes, and size and type of ditches.

A wide variety of buildings, bridges, gateways, tunnel portals, and other structures were constructed during the year from plans and specifications prepared by the landscape division, each carefully planned for its particular site. The standard of park buildings, particularly of residences, has been raised gradually each year, and last season's buildings will be of the best standard so far obtained.

PROTECTION OF PARK FORESTS

Recent surveys show several serious forest situations prevailing in the national parks. The worst occurs in the Yellowstone, where the mountain pine beetle threatens the destruction of the lodgepole pine that constitutes about 80 per cent of the park forest. This epidemic has been carefully studied by experts of the Bureau of Entomology, as well as by Park Service men and officials of the adjoining national forests. It appears that there would be perhaps a 50-50 chance of saving these lodgepole pines if a 5-year program of control could be undertaken immediately, at a probable cost of from \$3,000,000 to \$5,000,000.

This matter was discussed with the Appropriations Committee of the House of Representatives last year and is fully covered in the hearings. At that time it was decided that such an enormous expenditure was not justified, particularly as we have no definite assurance that the doom of the Yellowstone forests could be averted even were the necessary appropriations made and work undertaken immediately.

During the summer just ended another serious insect infestation has developed in connection with the forests of Yosemite and Sequoia National Parks. The situation is particularly critical in the Yosemite, where the great sugar-pine forest recently purchased jointly by Mr. John D. Rockefeller, jr., and the Federal Government is threatened by a pine-beetle infestation. Preliminary work was undertaken this summer but unless adequate control measures are undertaken here, the country's finest stand of sugar pine is in danger of destruction.

A still further menace to park forests lies in the sweeping movement of the white-pine blister rust, which first appeared in the East, moved across Canada, and is now coming down into western United States through Washington, Oregon, and Idaho. It is not definitely known whether the blister rust has yet entered California, but it is not too early to lay plans for intensive control measures in the national parks of that State. Blister-rust control has been carried on successfully in Acadia National Park for several years, and it is believed that by next year the white pine of Acadia can be considered as definitely saved through the eradication of host plants. Last year control measures were inaugurated in Mount Rainier Park to save a few selected stands of white pines. This work must be followed up intensely for a year or two if any worth-while areas of white pine are to be left in this park.



EXHIBIT INSTALLED IN NEW CASA GRANDE MUSEUM
Miniature model of compound in center, and pottery in background.



MUSEUM AT PETRIFIED FOREST NATIONAL MONUMENT
Rear view, showing large petrified log in foreground.



EXPERIMENTAL RADIO WORK IN MOUNT RAINIER NATIONAL PARK
Main station in the Administration Building at Longmire.



TESTING A PORTABLE RADIO SET

Blister rust is a fungus, its host plants being the currant and gooseberry. It has been discovered that the fungus can move only a small distance from the host to the pine, but after reaching the pine can move a long distance to other host plants. The method of control is to eliminate host plants within the necessary radius. Fortunately present indications are that in the West control can be established effectively.

If this is not done, experts of the Bureau of Plant Industry state that the resultant damage to the 5-leafed pine forests of the West will be a national calamity. And at the present rate of progress of control in comparison with the rapidity of intensification of the rust, probably 80 per cent of the western white and sugar pine will be destroyed.

In connection with all insect and tree-disease control in the national parks, the greatest need of the National Park Service at the present time is for type map surveys, to show the various types of forests in the parks, to what disease or infestation they are subject, and the cost of preventive and control measures.

EXPERIMENTS IN RADIO COMMUNICATION IN PARK WORK

In Mount Rainier National Park interesting experiments have been carried on in connection with the use of radio for communication between park headquarters and isolated ranger stations and with fire camps engaged in suppression of fires. The University of Washington has cooperated in this work by placing the personnel and the apparatus of its scientific research and general engineering departments at the disposal of the Park Service and has also been of great assistance to Park Engineer Waterhouse who has been mainly responsible for the work done to date. Their objective has been the development of a portable radio which will both send and receive voices and still be sufficiently light in weight to pack on horse or muleback. This would provide a very effective aid in forest fire fighting and in game patrol work. However, experiments do not justify at this time any conclusion that radio can take the place of telephone communication in high mountain areas. Radio appears to be an excellent supplementary means of communication, and results justify continuation of this experimental work.

PUBLIC UTILITY SERVICE

The operators of the public utilities in the national parks met in Washington last November for their third annual conference. Many problems of mutual interest to the operators, the Government, and the public were considered during the three days of the conference.

The most important of these was in connection with the franchises under which public utility services are operated in the parks. A most serious question had arisen through the interpretation of an opinion of the Comptroller General of the United States to the effect that the Secretary of the Interior was not authorized to cancel an existing contract and to grant a new contract in lieu thereof for the full term of 20 years authorized by law, when in the public interest, and when necessary to make possible the consummation of expansions and improvements for the benefit of the public in the national-park system.

After careful consideration and full discussion of the issues raised by the comptroller's decision, the conference reached the conclusion that it should request the Government to resubmit the question to the Comptroller General in order to clarify the situation. This was done by the Secretary of the Interior under date of March 31, 1932, and he received a formal decision from the Comptroller General under date of April 28, 1932, which contemplates, in proper cases, the cancellation of existing contracts, and the issuance of new contracts in lieu thereof for the full period of 20 years authorized by law, as legal and within the purview of the authority granted to the Secretary of the Interior by the Congress. This decision is a further assurance to the operators of the integrity of their contracts and the stability of their investments.

The full effect of the general economic conditions of the past three years was not felt in the national parks until the season just passed. While the volume of travel was well maintained, being only about 6 per cent below that of last year, it was by no means an indication of the patronage of the public utilities. The extent to which economic conditions have affected the volume of business handled by park operators can best be realized when it is remembered that gross receipts in 1930 were 35 per cent less than in 1929, the last year in which conditions were normal, that the gross receipts in 1931 suffered a decline of 35 per cent from those of the previous year, and that the volume this year was approximately 50 per cent below that of 1931. The continued decline in rail travel was the largest contributing factor to the poor showing made this year. Those traveling by other means conserved their funds by limiting expenditures to necessities.

With the amount of business in 1929 considered as an index at 100 per cent, we find that the volume has decreased to 21½ per cent in 1932. Under this subnormal state of affairs it is doubtful if any operator will show a profit for this year's operations. It is hoped that the low point has been reached and that steady improvement will be noticed from now on. The success or failure of these enterprises can not be gaged by the results of a year or two. As has been said in the past, they must be viewed in the light of results obtained over a 5 or 10 year period.

Many administrative questions involving rates and services during the past season had their origin in the unusual conditions prevailing. The Service cooperated in every way possible in meeting the desires of the operators for changes in rates, curtailed service and shortened operating seasons. Some experiments authorized, such as the changing from the American to the European plan and the approval of special rates for longer stays as well as lower rates for off-season travel, were productive of good results and will probably grow into permanent features.

During the past few years there has been a definite trend toward the lower-priced type of accommodations. Housekeeping cabins have exercised a particular appeal to private-car tourists, who are becoming more and more critical regarding these facilities. Patrons invariably compare the conveniences of these accommodations in the national parks with those in adjacent areas and in some cases we have suffered by this comparison. The time has come when the need of adequate facilities of this type must be recognized by all park operators. Existing plants in some parks must be modernized

and in others, where no provision has been made for this class of travel, new plants must be developed. Experience has shown that the financial returns from these operations are attractive and that the public will patronize them even to the extent of renting cabins in areas adjoining the parks when they are not to be had inside.

There were a few very important improvement projects carried out during the year by our park operators.

In the Grand Canyon National Park, Fred Harvey and the Santa Fe Railroad system installed a new water system, pumping water to the Rim from Indian Gardens, which lie 3,000 feet within the canyon itself. And at Desert View, a watch tower and kiva, several times the scale of similar structures of prehistoric inhabitants of the Southwest, was built to provide visitors with a place for rest and refreshment.

In Yosemite National Park, the utility operator built in the Mariposa Grove of Big Trees a new lodge, fully equipped to meet the increasing demand for meals and lodgings in this important section of the park. This new lodge replaces an old plant, much of which was destroyed by heavy snow accumulation last winter.

APPROPRIATIONS AND REVENUES

The appropriations for the National Park Service for the fiscal year 1932 totaled \$12,831,250. Of this amount \$77,000 was authorized in the first deficiency act of February 2, 1932.

Cash donations to the national parks and national monuments for the fiscal year ended June 30, 1932, amount to \$14,828.50. These funds were deposited in the United States Treasury and were expended under the same fiscal regulations which govern in the expenditures of Federal appropriated funds.

For the fiscal year 1933 there was appropriated \$10,640,620, of which amount \$7,640,620 was authorized in the Interior Department appropriation act, approved April 22, 1932, and \$3,000,000 in the emergency relief and construction act of 1932, approved July 21, 1932.

Despite the country-wide unfavorable economic conditions which prevailed, there was received a total income of \$820,654.19, which was derived from the operation of the national parks and national monuments this past year, as compared with \$940,364.79 a year ago.

Under the provisions of the economy act, the Secretary of the Interior has made transfers from the appropriation "Roads and trails, national parks," to enable certain other bureaus of the department to meet their most urgent expenses. The transfers are as follows: To the General Land Office, \$150,000; Geological Survey, \$284,400; Office of Education, \$30,000.

PARK ROAD DEVELOPMENT

In the 1932 fiscal year the cash appropriated for road and trail work amounted to \$7,500,000 as compared with an appropriation of \$7,078,800 in 1931. The Secretary of the Interior was also authorized to contractually obligate on construction projects an additional amount of \$2,850,000 in 1932, and \$2,500,000 in 1931. Of the \$7,500,000, the Interior Department appropriation act for the fiscal year 1932 made available \$5,000,000. However, there prevailed a strong

congressional feeling that provisions should be made for constructing a number of national park approach roads, which, unless special Federal aid was provided, could not be built within a decade or more. Passage by both houses of the so-called Leavitt Act, approved by the President on January 31, 1931, authorized \$7,500,000 annually for the fiscal years 1932 and 1933, \$1,500,000 of which the Secretary of the Interior was empowered to expend each year for the construction of approach roads which lead across lands wholly or to the extent of 90 per cent owned by the United States. Following enactment of this legislation, \$2,500,000 was appropriated by the second deficiency act of 1931, approved March 4, 1931.

Consideration by Congress of the 1933 appropriation was begun on a basis of the \$6,000,000 approved by the Budget Bureau, a reduction in the proposed road program by the \$1,500,000 contained in the emergency relief act of 1931, which act had for its purpose acceleration by the various Federal road building agencies of construction to alleviate unemployment conditions. By reason of congressional effort to balance the 1933 Budget, the cash appropriated was reduced to \$4,500,000, against which there were outstanding obligations of \$2,500,000 that had been incurred under authority of the 1932 act. While the bill was under consideration, the legislation authorizing the Secretary of the Interior to incur advance contractual obligations was stricken out in the House, with subsequent restoration by the Senate effected after the cash appropriation had been reduced to \$4,500,000. Although all prior roads and trails appropriations for the National Park Service had contained this authorization provision, there is no basic legislation similar to that contained in the Federal-aid and forest highway organic acts.

By the emergency relief and construction act of 1933, approved July 21, 1932, an additional \$3,000,000 became available for roads and trails construction in the national parks and national monuments so that for 1933 the roads appropriations were brought to the total authorized limitation of \$7,500,000. This act also enabled expenditure of funds for construction projects within the Shenandoah and Great Smoky Mountains areas for the first time.

The National Park Service was also placed on a parity with other Federal road building organizations by the requirement of securing 2-year authorizations in advance of appropriations. The authorization for appropriations to construct roads and trails in national parks and national monuments was contained for the first time in Senate bill 36, the general authorization bill for roads which is considered by both the House and Senate Roads Committees. The general authorization bill containing legislative provision for authorizations during the fiscal years 1934 and 1935 was passed by the Senate but not by the House and consequently awaits consideration at the December session of Congress. Authority is contained in the pending law to contract in advance for road work in the national parks and national monuments as now operative under the forest highway and Federal-aid appropriation acts. Such authority is essential to the most orderly and economical procedure in the placement of contracts for road construction. As with few exceptions the roads to be constructed in the national parks are at high altitudes, the completion of a practical contract in one year is not possible as generally there pre-

vail climatic and other factors compelling extension into a succeeding season.

With the privilege of entering into obligations contractually to a limited authorization for each fiscal year, units that are larger and those containing variable combinations of elements conducive to cost reductions and expedition of work can be contracted for with resultant better prices. The performance under contracts limited to one season would compel a division of projects to smaller units and inevitably there would be conflict between operators in their zeal to start operations on the sections in which they are concerned, which difficulties of operation would be reflected in higher cost prices. Another objectionable feature would be the spreading out over a longer period the obstructions which detain travelers over the park road systems. Entering into large contracts without the advantages of this authorization would tend to impound the cash in the United States Treasury until completion of contracts in the following construction season. The principle which has been operative in the financing of work has been partly on the basis of cash and partially by authorization, which facilitates and expedites reconstruction of roads because the construction and travel season are coincidental. These fundamental governing factors obtained in the basic law covering Federal-aid and forest highway construction and the Congress has given this authority to the National Park Service in annual appropriation acts.

As in past years the Bureau of Public Roads of the Department of Agriculture continued its excellent cooperation in major road construction in the national parks and monuments except in Mount McKinley National Park, Alaska, where the road work has been performed by the Alaska Road Commission. Effective July 1, 1932, the Alaska Road Commission was transferred from the War to the Interior Department, an arrangement which has facilitated fiscal matters, and, as the civilian personnel of the commission has been retained, construction and policy phases remain unchanged.

There have been constructed, reconstructed, and improved to date (cleared, graded, and surfaced) 361.32 miles of roads. In addition, work in various stages of construction includes 430.92 miles of clearing and grading, and 260.37 miles of surfacing. Considerable progress has been made on construction of adequate trail systems, \$1,687,720.71 having been expended on the construction of 732.04 miles of trails built on suitable standards of grade and alignment. While fine progress has been made to date, there still remain 1,199.20 miles of roads to be constructed and improved. Additional national parks have been authorized for establishment by Congress, particularly the Great Smoky Mountains in North Carolina and Tennessee, the Shenandoah in Virginia, Mammoth Cave in Kentucky, and Isle Royale in Michigan.

SUPERINTENDENTS' CONFERENCE

The first conference of national park executives to take place for more than two years was held at Hot Springs National Park from April 3 to 8. With the exception of Acadia and Mount McKinley, each park was represented by its superintendent, as were several of

the national monuments. The senior assistant director in charge of the branch of operations, the assistant director in charge of the branch of research and education, and myself were present. Representatives of several of the cooperating Federal bureaus, including the Bureau of Public Roads, the Civil Service Commission, and the Public Health Service, also attended the conference.

On the first day, Louis C. Cramton, special attorney to the Secretary of the Interior, addressed the gathering on the policies of the National Park Service as they have been evolved through legislation, especially those relating to Yellowstone, the first national park. Mr. Cramton made an exhaustive study of this subject during the past winter at your request. His formal report to you is being printed and will constitute a valuable addition to the historic records of the National Park Service. His findings reduce to concrete form the policies of the National Park Service as they have been established by Congress in laws enacted during the past 60 years, and will be of invaluable assistance in keeping to the course mapped out by the farsighted men who laid the foundation of our present national-park system.

Conference sessions began early and ended late and special group meetings were also held. Important administrative matters including road maintenance, ranger personnel, fire protection, wild-life problems, engineering questions, landscape development, educational work, cooperation with public utility operators, and camp ground developments were thoroughly discussed with mutual benefit.

PROFESSIONALIZING THE PARK SERVICE

While every permanent employee of the Service is under the classified civil service, it becomes insistently apparent each year that the National Park Service must be more completely professionalized. With increased municipal, State, and Federal park activities, park administration has become a profession, and should be definitely recognized as such. At the height of the travel season between 3,000 and 4,000 persons are employed by this bureau. As the system expands, the number will increase. Many are, of course, seasonal employees, but an organization of such size, spread over the vast territory represented by our 58 reservations, offers opportunities for specialized scientific and executive work of unique interest and great public importance.

Every year brings many changes in our organization, and it should be possible to fill all vacancies by promotion. Wherever possible this is done, but with the Park Service on a professional basis, more young men and women from our colleges and universities would be attracted into the Service, and the problem of securing qualified and properly trained persons for the higher positions in our organization would be solved. This statement is not intended as a reflection on the present personnel. The majority of our ranger force is college trained, and those who are not have proved their worth.

The superintendents' conference went on record as favoring the full professionalization of the National Park Service. The chief examiner of the Civil Service Commission, who attended the conference, expressed himself as favoring this step and even went so far as to say that he had often wondered why it was not done. Plans

for a new type of examination for ranger positions comparable with the present junior park naturalist examination is now under consideration, and it is hoped that when this is properly worked out, a register of college-trained men and women divided into special groups such as biologists, geologists, archeologists, and historians will be available. It is my belief that if experience is to be substituted for education at all, it must be national-park experience. The Civil Service Commission has assured all possible cooperation in this matter.

It is not at all unlikely that courses in park administration and development will be offered in some of our colleges and universities in the future.

AIRPLANES IN THE NATIONAL PARKS

An autogiro, the first machine of that type ever to land in a national park, was successfully brought down in Leidig Meadow in Yosemite National Park on May 22 by Capt. Lewis A. Yancey, noted trans-Atlantic flyer. He was accompanied by a representative of a news-reel agency who made some very fine pictures of the waterfalls, Half Dome, and other famous features of this park. Though Leidig Meadow is rough, covered with high grass, and provided a runway of less than 1,000 feet, Captain Yancey experienced no difficulty in taking off and cleared the 250-foot trees in perfect safety. It was his belief that autogiros would be extremely adaptable to winter patrol work in parks like Yosemite, stating that the machines work more smoothly on skis than wheels.

Airplane service at Grand Canyon was continued by the Grand Canyon Airlines, their operations being entirely outside the park. The National Park Service cooperated with the air lines by detailing members of the naturalist staff of Grand Canyon to accompany parties making the trip over the park as an experimental service to the public.

On July 10 the Assistant Secretary and I, with park officers and executives of the air line, made an extensive flight over Grand Canyon and Zion National Parks for the twofold purpose of studying certain boundary problems and to gather data for consideration of the general subject of making air service available in the national parks for sightseeing purposes. We were greatly impressed with the fine service now provided by the Grand Canyon Airlines.

The sublease of the Pacific-Alaska Airways (formerly Alaska Airways), from the Mount McKinley Tourist & Transportation Co., was again renewed. This company inaugurated its work of flying visitors over the park and to Mount McKinley in 1930.

STATE-PARK DEVELOPMENTS

The National Park Service continues, as it has for the past 12 years, to maintain close touch with the State-park movement, chiefly through the National Conference on State Parks, which was established in 1921 by former Director Stephen T. Mather. This organization is now headed by Col. Richard Lieber, director of the Indiana department of conservation and one of the most distinguished leaders in the movement for State parks. Three representatives of the National Park Service, including myself, attended its twelfth annual meeting,

held at Virginia Beach early in May, and were privileged to listen to addresses and discussions dealing with many phases of the State-park undertakings and with many problems identical with those we are facing and solving in the national parks. At the conclusion of the sessions at Virginia Beach, the delegates spent a day inspecting the Colonial National Monument.

State parks, the near-at-home outing places for nearly 45,000,000 persons each year, have continued to perform an exceptionally valuable function for the American people at a time when limited budgets have compelled economy in expenditures for vacations. Many States have reported notable increases in attendance this year over that of any previous year and the national conference estimates that the total will be in the neighborhood of 50,000,000.

Decreased appropriations, particularly for land acquisition, have resulted this year in a considerable slowing up of the acreage growth of State parks. There have, however, been some developments in the field decidedly worthy of mention.

California has gone steadily ahead on the acquisition program made possible by her State park bond issue of 1928. The most notable additions have been approximately 6,000 acres of virgin redwoods in the Prairie Creek region; establishment of Mount San Jacinto State Park, a high mountain wilderness of more than 12,000 acres; and the addition of several beach areas. As this report is completed, word comes that the famous Point Lobos area has been acquired by the California State Park Commission.

Illinois added to her parks a fairly extensive section of the Apple River Canyon, in the northern part of the State, which has long been urged for State parkhood. Indiana added 2,300 acres to her Brown County Park, which makes it now more than 3,400 acres, largest of the 10 in her system. The Virginia Legislature authorized an acquisition program in six definitely designated areas, and accepted the Richmond Battlefield Park. Michigan has largely completed acquisition of a 3,200-acre park near Ludington, containing a magnificent sand-dune exhibit; and has also made several smaller additions to her extensive system.

IMPORTANT CITY PARK PROJECT

An outstanding city park project is the Washington Heights Play Center of New York, on the site of old Fort Tryon, a \$5,000,000 park financed by John D. Rockefeller, jr. Forty per cent of the development work on this park has now been completed and the park will be opened to the public in 1934. Developments include landscaping and planting, the laying out of roadways and paths, and construction of necessary buildings and bridges. The beautification plans alone call for an expenditure of \$3,000,000.

SERVICE LOSES MANY FRIENDS THROUGH DEATH

The Park Service has again suffered heavy losses in the deaths of several of its former officials and staunch supporters.

Former Supt. Alex Sparrow, of Crater Lake, died in the Klamath Valley Hospital on January 24 as a result of a fall. He was a pioneer in national-park work and one of the ablest executives

we have ever had, as well as an outstanding man from the standpoint of both personality and ability. His record as superintendent of Crater Lake was exceptionally fine, for he worked there under very great difficulties, when appropriations were small and the National Park Service was a young, struggling organization.

Ex-State Senator W. F. Chandler died at his home in Fresno, Calif., on March 31, four days after the death of his wife. He had long been a friend of the Park Service and helpful to the park administration in many ways. Donations toward the purchase of the Martin tract at Marble Fork Bridge, the Redwood and Wet Meadows, and the first trail work in Mount McKinley National Park are among his gifts during his lifetime. He was also one of the first members of the California State Park Commission.

Judge William D. Fullerton, United States Commissioner for Yosemite National Park, died in San Francisco on February 26. Though failing in health for some time, Judge Fullerton's death was unexpected and his loss is keenly felt by his many friends in the Park Service.

The death after a 6 months' illness of Robert S. Donaldson-Selby, of Yosemite Park, on July 12 was greatly mourned by the park people. Because of Mr. Selby's long years of service in and love for the park, as well as the great esteem in which he was held by his associates, the flag was lowered to half-mast for three days. Mr. Selby first entered the Government service in 1912, and since 1921 has been custodian of the Yosemite Museum.

Dr. J. S. B. Woolford, of Roswell, N. Mex., died at his home on July 4. Doctor Woolford was a sincere friend of the National Park Service. This past summer while en route to Carlsbad I made him a brief visit. Although confined to his wheel chair, nevertheless his influence was extensive and his many acts of kindness and his outstanding unselfishness will long be remembered by the many Park Service people with whom he came in contact.

W. H. Peters, formerly superintendent of Grand Canyon and Mount Rainier National Parks, died on August 7 in the Veterans' Hospital in Portland. After leaving the Park Service in 1922 Mr. Peters became manager of the port of Grays Harbor. He remained a staunch advocate of the national parks until his death and had many friends among his former park associates.

Col. John H. Carroll, general counsel for the Chicago, Burlington & Quincy and Northern Pacific Railroads, and representative of the Hill railroad interests in Washington for many years, passed away in November, 1931. Partly because of his connection with the railroads but largely because of his keen personal interest in the national parks for their own sake Colonel Carroll never let an opportunity go by to aid us in the solution of park problems. He was particularly effective in interesting legislators in providing funds for developing roads and trails in the parks of the Northwest, especially in Glacier and Yellowstone.

Dr. C. P. Ambler, who died at Biltmore Forest, N. C., on June 7, was the originator of the earliest plans for a national park in the Great Smoky Mountains region. His vision of such a great park in the heart of the southern mountain region occurred during a fishing trip in 1899. He pushed the project with vigor for many years, but

it lay dormant until others took it up later in promoting the present park project. The establishment of both the Pisgah National Forest and the Great Smoky Mountains National Park may, however, be attributed in large part to this conservationist, who furthered these projects wherever and whenever he could.

THE YEAR IN THE PARKS AND MONUMENTS

Last year in order to conform to the President's policy of economy in Government expenditures, the reports of the various park and monument executives were omitted from Appendix D and a brief résumé of the outstanding achievements of the year in each park and monument was given in the main body of the report.

This year these reports are again omitted, and, going a step farther, it has been found necessary to omit the reports of the several field divisions carrying on specialized work in the parks and monuments. Their work is covered in the various sections in the main body of this report.

Below is a summary of work in the parks and monuments:

ACADIA NATIONAL PARK

The great event in the history of Acadia National Park during the past year was the completion and opening to the public of the Cadillac Mountain Road. This is one of the great drives of the world in magnificence, variety, and interest of the great sweep of land and ocean it discloses. From the standpoint of road construction and scenic effects there is nothing finer on the continent.

During the past few years Mr. John D. Rockefeller, jr., has constructed a system of driving roads some 48 miles in length open to the general public in the park and on his own lands adjoining the park, for foot and horse travel only. They form a truly park road system penetrating beautiful and theretofore unfrequented sections. He also completed and donated to the park the Mountain Road, a motor road which traverses the park for more than 5 miles and is used for automobile traffic, connecting Bar Harbor with Seal Harbor by way of the entrance to the Cadillac Mountain Road and Jordan Pond. Mr. Rockefeller during the past two years also offered to construct a scenic automobile road, about 11 miles in length, a large part of which was to be over park lands, and whose location involved the removal of the naval radio station from the Otter Cliffs. Negotiations have been carried on since then with the Navy Department with the view of finding another location for the station acceptable to that Department, and it is hoped that this may be achieved before Mr. Rockefeller's offer, which has been extended, is withdrawn. The road location has been laid out by eminent architects and engineers, and promises to be a most beautiful scenic drive when it is completed.

Educational work commenced.—A new departure in Acadia this year, opening a field of great interest and value, is the commencement of educational work along natural history lines through nature guide service. The field for such study in Acadia is unusually wide because it takes in not only the fauna and the flora of this northeastern territory, which is rich in both, but also the teeming life of the oceanic littoral, the sea beach at low tide, and the waters off the shore. Such

waters are life's most ancient habitat, parent to all life upon the land, the most crowded of all areas in the struggle for existence and the richest in diversity of form.

BRYCE CANYON NATIONAL PARK

The Bryce Rim Road, begun in 1931, was completed in July. Work is now going forward on a project to extend this road about $3\frac{1}{2}$ miles to Natural Bridge, a logical scenic objective, and it is expected that the undertaking will be completed before the end of the year. When the entire project is completed, this road system will afford unexcelled opportunities for viewing the beauties of Bryce Canyon. For 7 miles the road follows the canyon rim, and spurs to Inspiration, Bryce, and Little Bryce Points affording especially fine views. The entire project, including the Natural Bridge extension, is 14 miles in length.

The inner-canyon trail system in the vicinity of Bryce Canyon Lodge was completed. This project includes the Peck-a-Boo Canyon-Bryce Point trail, the Fairyland trails, and the trail from Sunrise Point into Campbell Canyon connecting the Fairyland trails. Bryce Canyon trails are noted for their excellence and are heavily used.

In spite of diminished revenues, the Utah Parks Co. continued its high standard of service at Bryce Canyon Lodge. In fact it may be stated that the park's visitors have never received better service at the Lodge than they have this year.

In the spring of 1932 the Utah Parks Co. began the construction of a cabin camp. The permanent buildings constructed were a cafeteria and a comfort station, temporary tents being used this season for sleeping accommodations. The unit was placed in operation on July 23. It is expected that several permanent cabins will be constructed next spring.

CARLSBAD CAVERNS NATIONAL PARK

Carlsbad Caverns is a motorists' mecca, with 97 per cent of the park visitors estimated as arriving in privately owned cars. For this reason the development of approach and tributary highways is vital to the future of the Caverns. Realizing this, and the value of the park to the Southwest as a tourist objective, the highway commissions of the States of New Mexico and Texas have cooperated by improving and keeping open to traffic throughout the year all of the near-by highways.

Cavern elevator.—The major construction work of the year was the completion of the 2-compartment elevator shaft and the installation therein of a high-speed elevator. The installation of the second elevator will be completed in the near future.

The first elevator was dedicated to public use on January 23 by Gov. Arthur Seligman, of New Mexico, who personally handled the controls during several trips.

The primary purpose of this elevator is to serve as an exit and to handle supplies, and visitors are urged to make the full cavern trip on foot unless unduly tired by the exertion. It is felt that in this way only can the full glory of the cave be appreciated.

Path construction.—Excellent progress was made in underground path construction, resulting in the elimination of many of the stairways and of difficult grades on all the main underground paths. The opening of the "Papoose Chamber" necessitated the construction of two tunnels, one 20 feet long and the other 40 feet, and simplified the handling of large groups of visitors.

With the paths now constructed, it is believed that parties aggregating 2,000 people can be handled at the same time, and without confusion.

Electric lighting system.—Improvement of the electric lighting system was continued. A new 240-horsepower Diesel generating unit was installed to augment the power furnished by the two 120-horsepower units already in use. It is believed that these three units will handle the power requirements of the park for some years.

Floodlights were placed in some rooms not previously so lighted, and marked improvements were made in concealing existing lights in several instances. Tentative arrangements were made to secure the services, without charge, of an outstanding sculptor in planning further lighting arrangements to show off nature's statuary in the caverns to the best advantage.

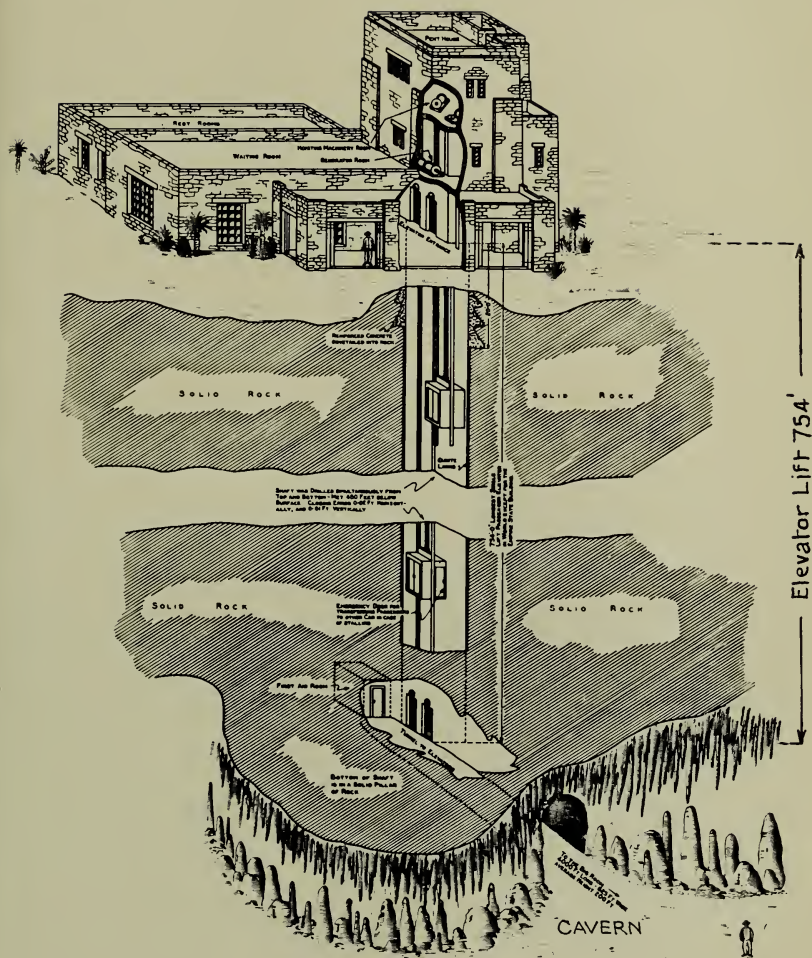
Water supply.—The present temporary water system at Carlsbad Caverns is inadequate for future needs, and for present needs in case of a protracted period of drought such as was recently experienced by this park.

To remedy this condition, an appropriation of approximately \$65,000 has been requested for purchasing and developing Rattlesnake Springs, about 5 miles south of the cavern entrance, as a permanent source of water for the park. A thorough survey of the sources available shows that Rattlesnake Springs is the most practical and economical solution of this important problem. The springs and the necessary right of way for a pipe line will be acquired, a pumping unit installed, and water brought into the big room of the caverns. A concrete reservoir 100 by 50 by 10 feet, lined with gunite, as a natural cooling plant, is planned from which water will also be piped to the surface, about 750 feet above.

This project will assure for Carlsbad an adequate and properly protected water supply. The park will undoubtedly experience a great increase in travel in the next few years and here, as in all places in the Southwest, the water supply is of foremost concern.

Animal and plant life.—The most interesting feature of the animal life at Carlsbad Caverns continues to be the 3,000,000 bats which live in the eastern portion. More visitors than ever before remained at the cavern entrance during the evenings last summer to witness the bat flight and hear the "bat lecture."

A profusion of southwestern cacti and other desert plants attracts the visitor and furnishes an excellent opportunity for nature guide service. The cactus garden in front of the cavern entrance was enlarged during the year and attracted much interest. Plans are now being considered to enlarge this garden to occupy the entire space between the office building and the Cavern Supply Co. building.



SKETCH SHOWING CARLSBAD ELEVATOR, WITH SURFACE BUILDING AND
ENTRANCE TO CAVERN



NEW BRIDGE ACROSS RIO PUERCO, ON THE ADAMANA APPROACH TO THE
PETRIFIED FOREST NATIONAL MONUMENT



NATURAL ENTRANCE TO CARLSBAD CAVERNS, SHOWING GROUP READY TO
START THE TRIP BY FOOT

CRATER LAKE NATIONAL PARK

The winter of 1931-32 will be long remembered in Crater Lake National Park. All snowfall records were broken, and it was estimated that between 85 and 90 feet of snow fell at the Rim. In spite of this the upper park roads from the Rim toward both the south and west entrances were kept open all winter, as a measure of protection from damage through spring washing. It has been proved that snow removal keeps down maintenance costs. Use of a rotary snowplow made this accomplishment possible. Early visitors this spring found 20 feet of snow on the level in the Rim area, and patches of snow were found along the lake shore and in shady places throughout the summer.

Insect control.—The intensive program of insect-control work of previous years was continued. More than 30,000 acres of lodgepole pine were treated. The so-called solar method of pine beetle eradication was not completely satisfactory this year in thickly forested areas and on northern exposures because of extremely cold weather, but the oil spray method to facilitate burning proved 100 per cent effective. It is now believed that the pine beetles are well under control and only a small allotment each year will be required to keep them in hand. This work is carried on in cooperation with the Bureau of Entomology.

Wild life.—Eight elk, the first to be seen in the park in several years, were observed near Mount Scott. Deer and black bear were comparatively numerous, and the beaver discovered last season were very active. Birds were as numerous as in past years, and a pair of cormorants was again found at the lake.

Fishing in Crater Lake Park continued to be superior to any location in the vicinity, including Diamond Lake and the Lake of the Woods, both noted fishing resorts. Two hundred thousand fingerling trout of the rainbow and silversides species were planted in the lake last fall and 40,000 in the smaller streams in the west and central part of the park.

Roads and trails.—The National Park Service completed this year a trail leading from the Rim Road to the summit of Watchman Peak and a trail from the Rim Area to Discovery Point. These were oiled and the Garfield Peak trail received its second coat. Approximately 25 miles of fire-protection motorways in the northwest and southwest sections of the park will be completed this year.

Lack of funds for the proper maintenance of oiled park highways during the past season caused many unfavorable comments by visitors. These roads are of the light oil-mix type and require constant attention under heavy traffic. Before these roads are in as good condition as the State highways leading to the park, additional work will have to be done.

Work on the road between Lost Creek and Kerr Notch was begun by the Bureau of Public Roads on June 27 and will be completed this fall. Another Bureau of Public Roads project, the grading of the section of highway from Diamond Lake Junction to the north park boundary, was begun on July 1 and will be completed this fall. Sections of the Rim Road were surfaced.

Educational work.—The work of the educational staff increased so greatly that it became necessary to assign rangers to assist in this

work. Field trips, lectures, and the museum features attracted many more visitors than during the previous season. Binoculars, range finders, and display exhibits were installed along the parapet of the Sinnott Memorial and proved very effective in telling the story of the building of Mount Mazama, its destruction and the creation of the caldera, and its filling with water. Nearly 7,000 persons attended the lectures given along the parapet.

GENERAL GRANT NATIONAL PARK

The General Grant unit of the Generals Highway was opened on July 27. This highway and 10 miles of the Kings Canyon State Highway were formally dedicated on August 28. The Kings Canyon Road is open to Observation Point where a magnificent view is had of the majestic Kings Canyon country. The Rocking Rock Road was greatly improved and made available to the public early in July. Very little trail construction was undertaken on account of a shortage of funds.

An outdoor amphitheater with log seats, accommodating 600 persons, was completed in Grant Grove in June and proved a distinct aid to educational work.

A camp development at Cedar Springs was also completed in June and proved very popular with visitors. Ninety-six tables with attached cupboards were distributed among the camps. Notable improvements in camp approach roads, leveling, and so forth were made during the year and attracted much complimentary attention from the public.

The seventh annual celebration at the foot of the General Grant Tree, officially designated as the Nation's Christmas Tree, was held in the afternoon of Christmas Day. Attendance was cut down by a heavy snowstorm, but the unusually fine program was witnessed by about 250 persons.

GLACIER NATIONAL PARK

The general situation throughout the country was reflected in the public use of Glacier National Park the past year. Travel decreased 16 per cent from the year previous, and the amount of business transacted by utility operators was about half of that for the preceding year. It is to be regretted that this situation existed during the 1932 season. Abundant snow and rainfall made the glaciers, streams, and waterfalls even more beautiful than normal, and vegetation was luxuriant. The park, famed internationally as a wild-flower garden, produced the most glorious exhibit in many seasons.

Park operations were featured generally by fine progress on the Transmountain or Going-to-the-Sun Highway. There is every indication at present that at least the greater part of the road will be open to travel in 1933, although work will probably be in progress during the entire season.

The amount of \$202,002.85 was spent on the purchase of private holdings, and of this amount, \$17,172.74 was matched with private funds for the purchase of the land owned by Somers Lumber Co., \$4,263.24 for purchase of Montana & Idaho Investment Co. holdings, \$19,953.94 for purchase of the holdings of the C. E. Conrad Estate

(Inc.), and \$151,882.93 for the Lake McDonald Hotel property. The remainder was paid for entirely by the Government.

Effective protection was maintained with the result that losses by fire amounted to less than 8 acres. Approximately 1,700 fir and lodgepole-pine trees were treated for beetle control.

Despite the decrease registered in the number of park visitors there was a substantial increase in the contacts made by the park naturalist force. By cutting down on the number of men employed on this work early and late in the season, funds were provided for two additional men during the height of the season, and this enabled the initiation of several new projects in addition to those carried on in the past.

Several buildings required for proper park administration were erected. A sewer system connecting the Many Glacier camp ground with the hotel company's system was completed, and a water line built to serve the camp grounds. Improvements in the telephone system were made and 3 miles of line in the vicinity of Lake McDonald Hotel were concealed by relocation.

Roads and trails.—Road improvements consisted of widening and straightening $8\frac{1}{2}$ miles of road along Lake McDonald, slide removal on other sections, dust palliative oiling of all main highways totaling 160 miles, and the rebuilding of rock retaining walls at several points. The only major road project was on the east side of Logan Pass, and is well ahead of schedule. The final contract for reconstruction of the old road from a point about a mile below Sun Camp to St. Marys Junction has been let, and, including surfacing, this should be completed by the end of 1933.

Trail construction was held to a minimum. The only new tourist trail construction authorized was the completion of the Triple Divide and Gunsight sections started last year. A total of \$10,000 was expended for the further construction of fire-protection trails.

Wild life.—Glacier National Park shows a steady increase in all game animals. Sheep are now as numerous as they were before the epidemic of the winter of 1926-27.

The elk on the east side of the park stayed within the boundaries during the winter, and consequently their loss was small. These animals seem to be drifting farther north and west into the park where the feed is more abundant. Several elk have been seen in the Lake McDonald district, where it is believed they have never been before.

GRAND CANYON NATIONAL PARK

The Grand Canyon was made more accessible during the year by road construction both within and without the park. Two bridges at the present time are under construction on the south approach road, at a cost of approximately \$28,000. Oil process paving of this road, which connects the park with United States Highway No. 66, was completed during the summer. Excellent progress was made in grading the first section of the Desert View-Cameron Road, connecting the eastern portion of the park with United States Highway No. 89. A second contract on this project will be let this fall. Paving of the north entrance road on the north rim was completed, and seal coating and surface betterments to 35 miles of roads on the north rim begun.

One of the outstanding engineering feats at Grand Canyon was the completion of the Santa Fe Railway pipe-line development from Indian Gardens. Water now is pumped by electricity from Garden Creek, approximately 3,000 feet below the rim of the Canyon, into storage tanks on the South Rim. At the present time 78,000 gallons of water are being pumped daily through the pipe line, eliminating the hauling of the water in tank cars from Del Rio, Ariz., 125 miles distant.

An interesting rest station and observation tower being erected at Desert View by Fred Harvey, the utility operator on the South Rim, is about 75 per cent complete. From its lower floor visitors already may obtain excellent views of the Grand Canyon and when finished comprehensive views of the surrounding country will be obtainable from the upper stories.

This new plant at Desert View was designed by Miss M. J. Coulter, who was the architect of Hermits Rest, and she supervised its construction. The public reception room where refreshments will be served is in the form of a great circular kiva, an enlargement in every dimension of the ancient ceremonial chambers of the Southwest Indians.

I regret to report that on September 1 the beautiful Grand Canyon Lodge, owned by the Utah Parks Co., and two deluxe cabins were completely destroyed by a fire which originated in the kitchen of the lodge. The loss, largely covered by insurance, was estimated at \$400,000. Consideration is now being given to reconstruction plans. The Grand Canyon Lodge property is on the North Rim.

From the 8th to the 15th of February flood waters poured down Cataract Canyon to join the usually peaceful waters of Havasu Creek, resulting in one of the worst floods in the history of the Havasupai Indian Reservation. The stream course was completely changed through part of the Indian village, seven hogans were washed away, tillable ground was destroyed, and Navajo Falls was changed to a cataract in place of the sheer drop which was its principal characteristic and outstanding beauty.

Educational activities.—An innovation in naturalist guide service occurred at Grand Canyon National Park this year when members of the educational staff accompanied parties on flights over the park. This work was carried on in cooperation with the Grand Canyon Airlines.

Cases and exhibits were installed in the Wayside Museum of Archeology telling the story of early man and his development. This is a presentation of the archeological story and supplements the geological exhibits at Yavapai Station, which were greatly improved this year by rearrangement.

Several hitherto unrecognized features of Kiva B of the Tusayan Ruin were brought to light this summer when this kiva, much washed-in since its excavation several years ago, was reconstructed and reinforced with cement.

Wild life.—The deer removed from the North to the South Rim by airplane some time ago continued to thrive and increase. This experiment has proved highly successful, and the friendly little creatures are great favorites with South Rim visitors. As discussed elsewhere in this report, a matter of grave concern is the disappearance of the great numbers of deer from the Kaibab Forest on the North Rim, which, of

course, materially affects the number to be found in the northern section of the park.

A little-known pastime at Grand Canyon, opportunities for which are constantly being improved, is fishing. Recently much attention has been given to developing this sport, and now the waters of Havasu and Bright Angel Creeks provide good fishing. A field hatchery was installed at Roaring Springs last winter, and rangers assigned for short periods of instruction in fish culture. Twenty-two thousand rainbow trout were hatched and later released in Bright Angel Creek.

GRAND TETON NATIONAL PARK

The subcommittee of the House Appropriations Committee in charge of the Interior Department appropriation bill, after visiting the Jackson Hole region in the summer of 1930, and there interviewing many people interested in the project which contemplates the enlargement of the park, took the position that until the future status of the park is determined, and until there is more interest displayed by the people of the region in the development of the park, there should be no more appropriations made for improvements. Upon our earnest presentation of the trail problem, it was agreed by committee members that this work might be continued on a reasonable basis. Therefore, the only construction project of importance in the Grand Teton National Park that was prosecuted this year was the extension of trails into the Teton Range. Work was concentrated on the loop trail connecting Death Canyon with Cascade Canyon, and which, when completed, will afford a tour around the Grand Teton and its associated peaks.

While in the park on my recent inspection trip I had an opportunity to travel over the Death Canyon section of this trail to a point high on the range. I was very greatly pleased with the trail from every standpoint. It makes accessible some beautiful country and the trail itself has been constructed with the greatest care to the end that magnificent views may be presented to the traveler using it while at the same time not in any way impairing the beauty of the mountains. This trail will be completed in the 1933 season.

Important among several changes in Grand Teton National Park during the past year was the establishment in May of a headquarters group near the old Stewart Ranger Station. Another change was the transfer of all this park's accounts from Yellowstone. They are now handled entirely by a Grand Teton employee.

In spite of a general travel decrease, the saddle-horse operator enjoyed an improvement in business over that of last year. This was undoubtedly caused by the improvements being made in the trail system.

A comprehensive count of the elk in the Jackson Hole watershed, known as the "southern herd," was made by airplane in February. The United States Forest Service, the United States Biological Survey, and the Wyoming State Game Department participated in this work. A total of 19,855 elk was actually counted. The hardships of the past winter greatly affected the moose in the valley, and in the spring many of them died. The direct cause of their death is not positively

known, but it is believed that ticks were largely to blame. Deer and bear are showing a good increase, and mountain sheep are holding their own.

GREAT SMOKY MOUNTAINS NATIONAL PARK

Land acquisition in the Great Smokies made good progress during the year. As stated already, in November deeds to 138,843.2 acres of land for inclusion in the park were presented to the United States, making the total 297,719.7 acres.

Roads and trails.—The one exception to deferring development of the park until the minimum land requirement is met is an authorization of \$509,000 for road surveys, road construction, roadside clean-up, and trail construction from the emergency relief and construction act of 1932. This sum will be expended on lands now in Government ownership, in order to prevent increase in the value of lands remaining in private ownership which must be purchased.

The largest project to be undertaken with this appropriation is the first section of highway that will traverse the park along the crest of the Smokies from Newfound Gap to Deals Gap. This first section will be built from Newfound Gap to Clingmans Dome at a cost of approximately \$400,000. As soon as the plans and estimates can be completed, the contract will be let and construction begun.

The North Carolina Highway Department has completed grading of the Newfound Gap-Smokemont project and surfacing will be completed this year. This has not only helped in administration and protection, but provides a route through the center of the park from which can be seen some of its greatest scenic beauty. As an example of the fine cooperation the park is receiving, the States of North Carolina and Tennessee will maintain all highways in the park to a high standard until such a time as the National Park Service can take over all maintenance.

Approach roads.—An extremely high-standard road is under construction from Knoxville to the Gatlinburg entrance, the greater part of this road being now under contract. A road survey has been completed from Maryville, Tenn., to Emmarine Gap. The park plans to continue this road from the park line to Cades Cove.

On the North Carolina side of the park, State Highway No. 112, from Cherokee to United States Highway No. 19, is now under contract. This contract will be extended from Cherokee to the park line. Surveys have been completed for a road from Waynesville to Cherokee via Soco Gap and Soco Creek. Reconstruction of State Road No. 107, from Cherokee to Ela, has been deferred until the Suncrest Lumber Co.'s railroad is abandoned.

Park planning.—Field officers of the Park Service have made intensive studies in the park during the past year, and as a result of the knowledge gained a comprehensive development plan along engineering, landscaping, and educational lines has been prepared. Further studies will be made during the ensuing year and by the time general development is permitted, plans will be available. The problem of working out a comprehensive program before development is started is an intricate one but extremely interesting. These studies will greatly expedite matters when the time comes for development work.

New headquarters.—Temporary park headquarters were moved from Maryville, Tenn., to Gatlinburg, Tenn., on June 1. At the present time this is the nearest tourist center on the Tennessee side of the park. The change has resulted in much better contact with visitors, and better administration and protection of the park.

HAWAII NATIONAL PARK

Again following the cycle of annual activity, the fire pit Halemau-mau in the Crater of Kilauea became active on December 23, 1931, after a sharp earthquake several hours earlier, and continued until the afternoon of January 6, 1932. Dense clouds of smoke suddenly rose from the crater as the activity commenced, and investigation showed that the floor of the crater had opened up in a northeast-southwest direction and lava was pouring from the crack in a spectacular manner.

The floor of the crater, which contains an area of approximately 80 acres, was filled to a depth of 100 feet with molten lava in the first 24 hours, indicating tremendous outflow. Fountains of lava played to a height of from 200 to 300 feet. The activity was one of the finest and most impressive spectacles in many years. As this was the holiday season, approximately 30,000 visitors came to the park during the activity. A description of the eruption was broadcast from the edge of the pit through radio station KGU in Honolulu and the National Broadcasting Co. stations on the mainland. This was the first broadcast of an active volcano and created much interest. By lowering a microphone over the edge of the crater, the roar of the fountaining lava, together with the explosions from gas pockets, could be plainly heard.

An important phase of the educational work of this park was the continuance of the summer school course, started in 1931, under the joint auspices of the University of Hawaii and the National Park Service. This work is proving very popular with students, many of whom are teachers, because it provides an opportunity to obtain credits without the expense of a trip to the University at Honolulu for a 6-week course, and because the park provides an unexcelled laboratory for the study of Hawaiian geology and flora. The entire park staff assisted in the work, studying with the students and serving as guides and sources of information. Park visitors were permitted to attend the lectures, and a surprisingly large number availed themselves of the opportunity.

So impressed is the faculty of the university with the interest in educational work in the park that plans are under consideration for the establishment of a branch of the University at Kilauea next year. If this is done, facilities for approximately 100 students will be provided.

Haleakala Road.—An inspection of the location survey for a highway from the park boundary to White Hill in the Haleakala section of the park was made early in the year by a member of the landscape division. As a result of changes suggested to make the road fit the landscape better, the Bureau of Public Roads is making a revised location survey. Work on this long-considered project will begin, according to present plans, about the first of next year, when

the territorial road to the park boundary is expected to be completed. The sum of \$200,000 has been allotted for its construction. Rising to an elevation of nearly 10,000 feet above the sea by a series of highly scenic switchbacks, the completion of the proposed Haleakala Road will mark an important step in the development of the Maui Island section of the park.

Travel.—Travel to the park amounted to 139,663, or 12 per cent more than last year's total of 124,932 visitors. Most of the travel was from the Territory of Hawaii. Mainland tourist travel dropped off materially because of general economic conditions.

Kilauea Military Camp.—The United States Army is interested in extending and developing the Kilauea Military Camp by landscaping the area between the camp and the main road, building new roads and paths, erecting a number of new buildings, and making other improvements. Major improvements during the past year were the installation of a field wireless set furnishing Government-owned, 2-way communication between the camp and Fort Shafter, Oahu. Their electrical system was also improved by the installation of more reliable and economical power for furnishing light for the Kilauea Military Camp and the Navy Health and Recreation Camp.

United States Geological Survey.—The work of the Geological Survey was expanded and the staff increased with special reference to seismology and study of topographic changes. Seven seismographs are now operated at Hawaii, and the seismograms from five Hawaiian stations are studied. Three pit seismograph cellars have been built around Halemaumau about 400 feet back from the rim to house tilt-measuring instruments which are continuously observed. The scope of scientific observations has been broadened and especial interest is being taken in the definite cycles of outbreak at Mauna Loa and Kilauea. It has been shown that Kilauea has averaged one eruption per year for the past seven years and that Mauna Loa is averaging outbursts every four and a quarter years, with its next eruption now overdue.

HOT SPRINGS NATIONAL PARK

Hot Springs National Park had the distinction during the past year of being the first Federal reservation now in the national park system to celebrate its one-hundredth birthday. During the week of April 25 this park, in collaboration with the city of Hot Springs, Ark., commemorated its creation as Hot Springs Reservation in the year 1832. The celebration included pageants of historical events from 1832 to the present; parades and dedications; and a complete historical museum overflowing with valuable articles loaned for the occasion.

In recognition of this important anniversary, the conference of park superintendents and other officials was held at Hot Springs National Park from April 3 to 8.

Change in administration.—Heretofore local administration of Hot Springs National Park has been through individuals appointed by the Secretary of the Interior, or, as in recent years, medical officers of the United States Public Health Service assigned on National Park Service detail as park superintendents.

Early in 1932 the Park Service installed an experienced national-park man as superintendent for the first time, and a policy of admin-

istration and development according to established national-park standards was adopted. Thomas J. Allen, jr., was transferred to this position from the superintendency of Zion and Bryce Canyon National Parks in Utah.

Studies of hot waters.—During the year studies with the most modern apparatus were made by a prominent authority on radium and allied subjects which definitely determined the actual presence of radio-activity both in the spring water of the park and in the vapors arising therefrom. At the time this report is written, the results of these tests are so recent that the amount of such activity has not been calculated, but its presence is certain.

Much hysterical comment and discussion followed the fatalities occurring in other parts of the country to prominent individuals who had unwisely used manufactured radium water evidently containing actual radium content. Every effort was made to prevent this hysteria from adversely affecting the use of the park's resources, whose power is received from radium emanation rather than from direct radium contact.

Although travel to the park held up well, the patronage to the various bath houses in the park was lower than it has been during a good many years. The uses made of the park's waters still elicit the same gratification and satisfactory comment as heretofore. The high standard of sanitation and service was maintained through regular inspections and frequent periodical physical examinations given to all attendants and employees in the bathhouses.

Free bathhouse and clinic.—Operation by the Government of the free public bathhouse for indigents was carried on in cooperation with a clinic in the building operated by the United States Public Health Service medical officers. Due to the large number of persons in financial difficulties and without means to purchase baths, the volume of business in the free bathhouse and the number of applicants for its service were greatly increased, so that cooperative measures between the National Park Service and the Public Health Service officers were necessary to eliminate all but the most pressing cases and to limit the amount of service given each individual.

New hot water system.—The new collecting and distributing system which was completed at the beginning of the year operated very efficiently in collecting water from the various springs and distributing it to the individual bathhouses. The matter of metering this water has not as yet been satisfactorily worked out, but experiments are being made in cooperation with the manufacturers. A registering thermometer, recently installed, shows the temperature of the water after collection in the central impounding basin to be 140° F.

Therapeutic pool.—The therapeutic pool installed a year ago for underwater treatment of persons recovering from paralysis or extreme muscular ailments has continued to be of valuable service and is increasing its use. There have been many remarkable benefits received by persons utilizing this pool.

Army and Navy Hospital.—Construction of the new 408-bed hospital by the Army quartermaster for Army, Navy, and Veterans' Bureau purposes is well under way. The building, which is located on national-park land assigned for Army and Navy uses, occupies a prominent position, and the architecture was approved by this Service in accordance with the authorization act.

LASSEN VOLCANIC NATIONAL PARK

A number of authorities on skiing and winter sports who made trips through Lassen Park in midwinter are unanimous in the opinion that the park offers one of the very best localities for winter sports in California, if not in the entire West. The monthly snow survey records of the State of California cooperative snow surveys indicate, on the basis of annual monthly snow measurements from 286 snow survey courses throughout California, that usually more snow is found in this park at the foot of Lassen Peak than anywhere else in the State. Winter road maintenance would undoubtedly bring much travel to this park.

Fishing.—The fine opportunities offered by the numerous lakes and streams of Lassen Volcanic National Park are being fully developed through restocking activities and proper protection. Approximately 520,000 trout fry and fingerlings were planted during the past season, and continued fish-cultural activities will make this splendid wilderness park one of the most famous fishing areas in the country.

Educational work.—So popular has the educational work in this park proved that the limited naturalist and ranger personnel were unable to meet all demands during the past season for this service. Several museum and library donations were received. The museum exhibits and furnishings were rearranged to make improvements suggested by experience, and the grounds are being landscaped with native shrubs and plants. This will assist the naturalists in their work, as well as enhance the appearance of the museum.

The museum building, an important exhibit of photographs of the eruption of Lassen Volcano in 1915, and other valuable park improvements are gifts of Mr. and Mrs. B. F. Loomis in memory of their daughter.

Approach roads.—The southwest, or Mineral, approach road, which at present carries the bulk of the visitors entering the park, is a fine, standard, hard-surfaced highway, with the exception of a 3-mile section of county road. Plans are under way to obtain funds for the rebuilding of this section.

Contracts have been let by the Bureau of Public Roads for the construction of the Viola-Manzanita Lake approach; for the surfacing of the first two sections of the Mount Lassen-Mount Shasta Forest Highway which runs north from the park down Hat Creek; and for the surfacing of the Morgan Mountain cutoff, construction of which was completed this season. All of these new approach roads join the Lassen Peak Loop Highway, or continuations of it, and will provide excellent standard forest highways serving the western half of this park from all points.

The Mount Shasta-Mount Lassen Forest Highway and the Lassen Peak Loop Highway are the two northern sections of the proposed 800-mile intermountain highway system to be known as the "Sierra Way," now under construction on many sections. When completed it will run from Mount Shasta City, near the Oregon-California line, through this park, to Lake Tahoe, Yosemite National Park, Sequoia and General Grant National Parks, and again join the Pacific Highway at Bakersfield.

Loop Highway requires resurfacing.—This season unforeseen difficulties were experienced with the newly laid surface on the Lassen Peak

Loop Highway. First indications of trouble were noticed the early part of this spring. As the snow receded and the roadbed was exposed to the sun, it was found that free oil was rising to the surface and being picked up on tires of passing cars and trucks. To remedy this sand was spread on the road to absorb this oil.

Somewhat later in the spring, the oiled surface, which was put on last season, began to break and buckle in a number of places, while on other sections it became corduroyed. A complete resurfacing of a different type may be necessary.

Lassen Peak Trail.—The popular Lassen Peak Trail from the main park road to the summit of Lassen Peak, completed last year at a cost of \$10,000, was heavily used. It is the most popular hike in the park. During July and the first 21 days of August 3,026 persons made the climb to the summit and placed their names in the register established at the top. Of course many climbers did not register and others did not get to the summit.

Volcanic activity.—No major changes in the steam vents, boiling pools, boilers, or other forms of volcanic activity have occurred this past year. On the top of Lassen Peak, which was in eruption from 1914 to 1917, only a very little steam can be seen wafting up from underneath several large boulders. The more active areas at the base of Lassen Peak, of the same general type of activity as are found at Yellowstone National Park, present a spectacular display which is always fascinating to visitors.

MESA VERDE NATIONAL PARK

Progress in road building was the most important development in Mesa Verde National Park this year. The steep, narrow, slippery roads which constituted the highway system of this park prior to 1928 are now superseded almost entirely by broad safe highways that constantly unfold panoramas of Mesa Verde's beautiful scenery. With the completion of work now underway, this park will offer to motorists some of the finest and safest mountain roads to be found anywhere in the Southwest.

Trails to all ruins visited by regularly conducted parties were reconstructed early in the season and many dangerous places eliminated, though care was taken not to spoil their primitive charm by the addition of obvious safety features. Mesa Verde rangers established the remarkable record this year of conducting more than 24,000 visitors through its essentially inaccessible cliff-dweller and pueblo ruins without a single mishap.

At a comparatively small cost, the old Ute Trail, impassable through years of disuse, was reconditioned, because it had qualities of the highest scenic and archeological interest. In a round trip of approximately 6 miles more than 20 cliff dwellings are seen, and 2 miles of the trail skirts the rim of Navajo Canyon and affords magnificent views. So easy is the horseback trip over this old trail that within two weeks after it was opened it was the most popular one in the park.

By presidential proclamation dated May 27, a small parcel of land, a gift from its owners, including about a mile of important approach road adequately protected on each side, was added to the park. Negotiations for the purchase of the Prater Canyon holdings are still pending. This area should be acquired. It has practically

no commercial value, but would bring into park ownership an exceedingly beautiful canyon, preserve its lovely flowers, and make available to the wild animals a splendid surface spring which is now entirely fenced off.

Protection of ruins.—It has been a matter of grave concern that there are no accurate maps of the major archeological ruins of Mesa Verde National Park. In the event of destruction from earth tremors, or several other probable causes, authentic repair or restoration would have been impossible. During the past year this situation has been partially remedied through the work of a young architectural engineer who has carried on an extensive mapping and photographing program that will permit the successful restoration of any ruin that it includes. This important undertaking began with Cliff Palace and Spruce Tree House, the largest of the hundreds of notable ruins in the park, and has been largely a labor of love, as only a very small appropriation was available for this purpose.

In an effort to gain more inclusive dates for the cliff dwellings and particularly, if possible, to establish dates for the surface pueblos as well as the earlier basket-maker cultures in the Mesa Verde, a graduate student from the University of Arizona who has worked under Dr. A. E. Douglass spent two months at the park collecting beam ends and bores from timbers in all of the major cliff dwellings, Far View House and other surface pueblos, and numerous basket-maker sites. Results of this research have not yet been published, but it will probably provide important material for educational work in the park.

The benefits of the protective work on Sun Temple were fully realized this year. As a result of correct drainage, the walls withstood snow, freezing, and thawing without damage. It is sincerely hoped that as time goes on sufficient funds will be made available for continuing this protective work.

Travel and educational work.—The 12 per cent travel decrease for Mesa Verde under its 1931 record was almost entirely preseasonal. The decrease for August was negligible and the July total exceeded that for last year. A new single-day record was established on July 15 when 886 visitors were registered.

The educational division made an unusual record when more than 96 per cent of all park visitors availed themselves of the regularly conducted trips to the ruins, a remarkable contact average. An important addition to the museum was the installation of an exhibit explaining the tree-ring chronology which has played such an important part in establishing archeological dates.

Improvements.—Through the personal interest of Members of Congress and officials of the Bureau of the Budget who made an inspection of Mesa Verde in April, 1931, an appropriation of \$22,000 was made available for the continuation of work on a badly needed well, previous drilling of which had been halted because of lack of funds. This project has now progressed to a depth of nearly 3,700 feet, and funds are available to go to 4,200 feet if necessary. At present the flow is 13,000 gallons a day, and it is hoped that by the time the work is completed enough water will be encountered to meet the needs of the park. The assurance of an adequate water supply for Mesa Verde would solve an important problem.

A high-tension transmission line will soon be completed and will provide electric energy at much lower costs than it is possible to



RESIDENCES FOR PARK PERSONNEL AT GEORGE WASHINGTON BIRTHPLACE
NATIONAL MONUMENT WHEN NEARING COMPLETION



MOORE HOUSE, AT YORKTOWN, WHERE ARTICLES OF SURRENDER WERE
WRITTEN IN 1781

Interior repairs made and opened as a museum.



Courtesy United States Bureau of Public Roads

SKYLINE DRIVE IN SHENANDOAH NATIONAL PARK PROJECT

Stony Man and Skyland in the distance.



Clatworthy Photograph

LONGS PEAK FROM "MANY PARKS CURVE" ON THE NEW TRAIL RIDGE ROAD, ROCKY MOUNTAIN NATIONAL PARK

provide it with the small, inadequate plants now in use. About 4 miles of right of way through privately owned lands necessary for the construction of this line were obtained without cost to the Government through the cooperation and assistance of the owners. This and similar cooperative measures by friends of the park have made it possible to complete improvements at Mesa Verde that would otherwise have been indefinitely postponed by the necessity for economy in all expenditures.

Public utilities.—An important change in service to the public this year was the acquiring by R. Hunter Clarkson (Inc.), of the Gallup-Mesa Verde Stage Line. Operating in close cooperation with the Santa Fe Railroad, and using the best equipment, this company is able to render excellent service to transcontinental travelers wishing to take a side trip to Mesa Verde.

MOUNT McKINLEY NATIONAL PARK

The addition, on March 19, of 246,693 acres to Mount McKinley National Park brought its total area up to 1,939,493 acres. This is the second national park in size, Yellowstone being the largest of the system.

The extension of the McKinley boundaries is an important administrative step for several reasons. On the northwest it brings into the park the Wonder Lake area. This is the most advantageous section of the park from which to view Mount McKinley, and the lake shore has been suggested by the chief landscape architect of the National Park Service as one of the most suitable locations for a hotel or lodge development. The lowlands of this region provide excellent pasture for the wild animals, thus insuring their protection from hunters during the winter when they migrate to low altitudes in search of food. On the east the park boundaries were extended to make the west bank of the Nenana River a natural wild-life boundary line for the park.

The jurisdiction of the Alaska Road Commission, which is constructing the highway through the park, was transferred from the War Department to the Department of the Interior, with the Governor of Alaska as its head.

Severe winter weather brought about the largest loss in mountain sheep experienced in many years. Some died from starvation and others were the prey of wolves. The lamb crop was very small. Grizzlies, moose, and caribou appear to be on the increase. The wild life of this park will be greatly benefited by the protection afforded through the boundary extensions.

As a safety measure, a medical student was employed at the Savage River Camp. In addition to his first-aid work, he also acted in the capacity of naturalist, giving talks on the plants and animals of the park and the various mountain-climbing expeditions.

I am very proud to report that the park superintendent and one of his rangers were members of an expedition of four men who succeeded in climbing both the north and south peaks of Mount McKinley early in May. This was the first expedition ever to accomplish the feat of ascending both peaks. (See page 13.)

MOUNT RAINIER NATIONAL PARK

This scenic park with year-round travel has developed rapidly of late. A heavy Government construction program at headquarters and at the new Sunrise development on the north side, together with extensive road building and new company construction, has made this past year an epochal one.

The new Naches Pass Highway, 60 miles of which has been dedicated as the Mather Memorial Parkway, was thrown open to general traffic on June 15. For the first time since its establishment, Mount Rainier National Park is now directly accessible to travel from the eastern part of Washington. Though final construction work on two sections of the highway caused considerable inconvenience, the road sprang into immediate popularity and was used extensively. Observation parking spaces and artistic benches and guard rails are features of Rainier's road development.

With the opening of this new highway to traffic regular stage transportation service was established for the first time between Yakima City and the northeast section of the park. Arrangements were made with the Washington Motor Coach Co., which operates on the State road, to haul all park passengers from Puget Sound and eastern Washington points to the junction of the White River Road and State highway. Here passengers were transferred to Rainier National Park Co. stages for the trip to Sunrise Lodge. This service was very satisfactory.

Contracts for approach roads to the Ohanapecosh and Mowich entrances have been awarded by the State, and the accessibility of these two sections of the park is now assured.

During the winter of 1931-32 travel showed a decided increase, mainly because the Nisqually Road was kept open from the entrance to Canyon Rim, leaving the hiking distance to Paradise Valley only 2 miles. The winter sports program continues to lure the public. The cities of Seattle and Tacoma held winter outings in the park and decided to make them an annual custom. With severe general storms in February, however, travel fell off greatly. Summer travel also was reduced owing to the severe economic pressure and inclement weather, resulting in a 26 per cent loss of total travel compared with 1931, the figures being 216,065 as against 293,562 for 1931.

Maintenance heavy.—All maintenance work was unusually heavy due to severe snowstorms during the winter and high water in the early spring months. Snow removal on the roads, unusually difficult, consumed more time than customary. Numerous slides occurred along the highways and trails and many of the trail bridges were washed out. Telephone lines were badly damaged, and in many places entire sections were completely destroyed. However, all were in temporary operation by July 1. Due to lateness of the season, some of the trails at the higher elevations were not free of snow until the end of August, though all were open from the 15th of July.

Sunrise Ridge Camp.—The new camp area developed at Sunrise Ridge in Yakima Park on the north side of Mount Rainier now presents a fine appearance and is drawing increasing travel. A water system and an electric system have been installed by the Government and increased facilities added to the camp grounds. Accommoda-

tions for the public include a lodge with cafeteria and 200 housekeeping cabins. Views of Mount Rainier and its glacial system from this point are unsurpassed and with its good approach road and present facilities this area is certain to gain in popularity.

Better service to visitors.—One of the most encouraging results of the season's operations was the increase in expressions of appreciation received from visitors who were better served by our National Park Service organization than ever before. Increased personnel permitted a greater percentage of personal contacts in spite of decreased attendance. The educational program at Sunrise, begun last year, was augmented and proved particularly satisfactory. As reported by numerous visitors in letters of commendation and appreciation, these improved services were responsible for increased average length of stay in the park. Summit climbers were few in numbers and glacier trips fell off in attendance.

Much credit is due the Rainier National Park Co. for carrying on its usual high-class service in the face of economic loss due to lack of patronage. Drastic rate cuts, salary cuts, and reductions in personnel were made to combat the situation, but the standards of service were never lowered. The officials and personnel of the company deserve high praise for their splendid spirit in the face of discouraging conditions.

Fish culture.—After an exhaustive study of all possible sites within the park, the United States Bureau of Fisheries chose a site for a hatchery at Silver Springs, just outside the north boundary of the park in the Rainier National Forest. The hatchery was completed during September and placed in operation. This splendid cooperation on the part of the Bureau of Fisheries definitely assures proper stocking of park waters and that fishing in Mount Rainier will be up to Park Service standards.

Glacier measurements.—In cooperation with the city of Tacoma and the United States Geological Survey, glacier measurements were continued, with plans being perfected to measure the recession of the Emmons, Carbon, and Tahoma Glaciers as well as the Nisqually.

PLATT NATIONAL PARK

As a result of increases in appropriations the past several years and the appointment of a trained national-park executive as superintendent, Platt National Park has shown marked improvement in appearance. This park is now on the list of areas covered by one of the landscape representatives, and his work is evidenced in a general clean-up of the park and in the improved location of trails. Two important new features are the superintendent's residence, now under construction, and the replacement of the old elk paddock.

A hydraulic ram was installed to bring sulphur water to the pavilion at Black Sulphur Springs, an accommodation which has met with great public approval though the actual work involved was very slight.

A small area containing a swimming pool and equipped with tables was set aside for the exclusive use of negro visitors. As an administrative step, this procedure was highly successful.

ROCKY MOUNTAIN NATIONAL PARK

As authorized by act of Congress approved June 20, 1930, the President, by proclamation of January 11, 1932, added 3,075 acres to Rocky Mountain National Park. The newly-added land lies along the Thompson River drainage, on the eastern slope of the Continental Divide.

During the past year, the Government acquired, by voluntary sale, title to 4,414 acres of land, in 20 transactions, with a total expenditure of Government funds amounting to \$435,316.00. An additional 240 acres was placed under contract for purchase. All of the land purchased is meadow land lying along the Thompson River drainage. Topographically it belongs in the park, and its acquisition will greatly facilitate and protect road construction and will afford winter forage for deer and elk.

Roads and trails.—The Trail Ridge Road, an outstanding accomplishment in Rocky Mountain National Park, will be completed by the end of this construction season if weather conditions permit, and appropriate ceremonies to mark the completion of this great scenic achievement will be held early next summer. The east side of the Trail Ridge Road was opened to travel about the middle of July, and the west side is now nearing completion. Constructed at a cost of approximately \$1,250,000, the marvelous scenic beauty of this road is attained through its great altitude. For 4 miles it is located over 12,000 feet above sea level, and another stretch of 11 miles is above the 11,000-foot elevation.

On account of limited appropriations, trail construction for the most part was concentrated in the Bear Lake area where trail use is especially heavy. Trail development in Rocky Mountain is of paramount importance because of the heavy use of the entire trail system by both hikers and equestrians. Though there are only about 200 miles of trails in this park, approximately 1,500 saddle horses were in use there during the past season.

Educational work.—Considerable progress has been made by the educational department during the past year. Through an arrangement with the Estes Park Trail, nature notes from Rocky Mountain National Park have been made available in printed form. All museum material has been catalogued and stored. A manual of administration and instruction for the educational and protection departments has been prepared. Much favorable comment has been received from local residents on the nature work and the Rocky Mountain Nature Association has been organized as a direct outgrowth of the activities of the educational department.

Travel increase.—Despite a general decrease in visitors to other recreational centers through the country, travel to Rocky Mountain National Park was greater than in previous years. The opening of the east side of the Trail Ridge Road, a slight boundary adjustment, and the accessibility of the park from the eastern centers of population, were all probable contributing factors in drawing more visitors to the park. A total of 282,980 visitors was recorded at park entrances this year as compared with 265,663 visitors last year—an increase of 6.5 per cent.

The record for visitors entering on a single day was also broken on July 4, when 6,822 persons in 1,885 cars were recorded. The park

experienced the greatest travel week in its history, August 10 to 17, when 21,268 visitors in 6,258 cars entered the park. A marked decrease in rail travel was noted.

This park has extremely interesting possibilities as a great winter sports area, and popular demand will undoubtedly bring about a great increase in the near future of present activities along this line.

SEQUOIA NATIONAL PARK

Several projects which vitally affect development of the Sequoia National Park are now nearing completion. The State Approach Road from Visalia has been steadily improved during past years and the 10-mile section through the foothills from Lemon Cove to Three Rivers is being entirely relocated on modern highway standards. The Ridge Route on the Golden State Highway between San Joaquin Valley points and Los Angeles is being relocated and next year will bring the park an hour nearer to southern California points.

Within the past 10 years, travel time from Los Angeles and Visalia to the park has been drastically cut. The nearest national park to the great metropolitan and tourist center of southern California, Sequoia is receiving increased patronage from that area and will be much more heavily patronized as soon as highway projects now under way are completed.

The Generals Highway between Sequoia and General Grant National Parks, which has been under construction since 1928, now has been built for 16.92 miles of the total distance of 29.23. Of the remaining 12.31 miles, 5.38 are, or will soon be, under contract. If funds are made available this magnificent highway should be open to the public in 1934.

The Generals Highway connects at General Grant National Park with the State highway now being built into the Kings River Canyon. This road has already been constructed for 10 miles beyond General Grant Park and has opened views of the Kings River Canyon comparable with the famous Inspiration Point view of Yosemite National Park. The section of this highway already opened is attracting heavy travel and when the interpark road is completed it is safe to predict a tremendous increase of travel both to Sequoia and to General Grant.

Trail construction.—Construction on the High Sierra Trail from Giant Forest to Mount Whitney is nearing completion and large sections of it were used by the public this year. Sixteen and a half miles of high-class trail were built during the year, including a 125-foot suspension bridge over the Hamilton Lake Chimney.

Nearly 200 members of the Sierra Club traversed the completed sections of the High Sierra Trail this year, and they unanimously declared that the scenery opened up is not surpassed in the whole Sierra Nevada. The magnificent domes, cliffs, and pinnacles of the River Valley-Hamilton Lake region have been brought within four or five hours easy riding from Giant Forest. The High Sierra Trail is the first high-class trail to be flung across the Sierra Nevada.

Forestry, landscape work, and insect control.—Though only a little more than \$2,000 was available for forestry, considerable progress was made in this work. Three hundred incense cedars were procured by digging from places of excessive natural seeding, and 630 trees were

received from the Devil Canyon Nursery. The fire area on Mehrten Creek was planted with 400 yellow pines from the Ash Mountain Nursery.

The Ash Mountain administrative area was planted and the park entrance landscaped. Miscellaneous planting was done in Giant Forest and further efforts made to landscape the General Sherman Tree.

Continued efforts were made on bark beetle control, but inadequate funds have resulted in incomplete results in every case except at Lodgepole Camp where the work was successfully accomplished two years ago and now requires only maintenance. Sufficient funds for systematic use will have to be provided in order to make the control work satisfactorily effective.

WIND CAVE NATIONAL PARK

Moving the old administration and operators' building to a new site and brightening up the structure by painting, the elimination of the unsightly wooden stairs and trestle work leading therefrom to the cave through the construction of a new modern trail, and the construction of an inconspicuous cattle guard conforming to new standards near headquarters greatly improved the appearance of the park. Several new buildings of native stone and Spanish stucco construction in the administrative group make the headquarters area an attractive unit almost up to the usual national park standard. When the new administration and operators' building can be constructed, Wind Cave will then come into its own.

The new road, which was given a rock base course surface last year, is being given a permanent oil surface treatment making it a dustless road equal in standard to the State roads it joins. With the rounding and sloping of ragged road shoulders it, too, adds to the greatly increased favorable appearance of the park.

The second deficiency act of 1931 appropriated \$50,000 for the construction of a water supply system at Wind Cave National Park. On June 16, 1931, under authority contained in this act, an agreement was entered into with Robert and Fannie McAdam for the purchase of 100.77 acres of land containing fine springs. The agreement provided also for sale to the Government of a right of way for a pipe line through property still held by the McAdams. Title finally passed to the Government on October 13. Construction on force account began immediately thereafter, and the pipe line was finished early in June, 1932. Careful supervision and efficient labor made possible consistently low unit costs and resulted in a saving of \$6,700 from the amount allotted.

Supplementing the existing supply of water at Wind Cave, this system provides adequately for all probable increases in the park's needs for many years to come, and is so installed as to deliver any surplus direct to the artificial lake known as the buffalo reservoir.

The number of visitors actually shown through the cave in the 1932 travel year was 12,539, compared with 18,716 for 1931. Maintenance of park gateways and checking stations is impracticable because the cave and headquarters are situated on a main highway. The decrease in actual admissions to the cave is attributed to general economic conditions. It is proportionately less than the decrease in travel experienced at other points of interest in the Black Hills.

The game protector in charge of the herds maintained in the park by the United States Bureau of Biological Survey reports that there are now 200 buffalo in the park, 50 elk, and 50 antelope, and that black tail and white tail deer are making a good start in both pastures. Owing to dry weather, the range was very poor in the fall of 1931, making winter feeding necessary. During the 1932 season, however, there have been frequent rains, and range conditions have never been better.

YELLOWSTONE NATIONAL PARK

This year marks the sixtieth anniversary of the establishment of Yellowstone National Park. There was a continued improvement in roads and facilities available to visitors. The park itself was never more beautiful, as the season was favorable to an unusual abundance of wild flowers. The summer forage for elk and other grazing animals was abundant and remained green until late in the summer. Weather conditions were excellent from the standpoint of the park visitor. Fishermen reported good catches in all sections of the park and the fire hazard was not serious until late in August.

There was a noticeable difference in the type of accommodations visitors were seeking and there appeared to be a tendency to go through the park as quickly as possible with the least expense. The experience of this past summer will probably result in extensive changes in the operations of the hotels and lodges in order to meet the new desires of the traveling public.

Many park visitors have expressed appreciation of the improvement in the park highways, particularly the road from Obsidian Cliff to the Firehole Cascades and from Lake Butte to the east entrance, which were surfaced and oiled last year. Visitors no longer suffer from the dust nuisance as practically the entire loop road has received at least a palliative oiling. The new road from Canyon to Tower Falls over Dunraven Pass offers a splendid highway with fine views on both sides of Dunraven Pass.

Educational work.—The opening of the Fishing Bridge Museum and installation of its exhibits completed the splendid series of trailside museums in Yellowstone National Park. Funds for these museums were furnished by the Rockefeller Foundation, and the construction program was directed by the American Association of Museums. Much interest was shown in them by the visiting public.

Important in Yellowstone educational work was the inauguration of two new types of guided trips—a game stalk caravan about dusk and a sunrise trip over the formations at Mammoth. Both met with popular approval.

Wild animals.—Park visitors enjoyed seeing numerous wild animals and many an opportunity was had for good still and motion pictures. Moose were plentiful and were observed daily along the highways, especially at Willow Park. A band of antelope remained in the field inside the north gate and afforded much pleasure to persons entering and leaving by this gateway and also to those who made the trips to Gardiner with the game stalking caravans from Mammoth. Mountain sheep could be seen daily from Mount Washburn.

Bears were numerous everywhere and were really the main source of grief to the park administration and campers. The bears had in-

creased to such proportions and there was such a shortage of food due to the decrease of business at the hotels and lodges that they became exceedingly bold, particularly around the camp grounds and house-keeping cabin area, doing considerable damage to cars and property belonging to visitors and park operators. Authority therefore was given during the summer for the disposal of surplus bears, both black and grizzly.

Fire protection.—The fire-protection program for Yellowstone was changed considerably following the 1931 fire season. The new program requires enlargement and standardization of all fire-tool caches in the park, an increase in the number of trails and transportation facilities, better trained personnel and, in general, a reorganization of all fire protection facilities to meet any serious emergency as well as normal conditions during fire seasons in the park. Many steps toward the completion of this program, which will require several years' time, have been taken during the past year. All fire equipment on hand has been reconditioned and segregated into outfits necessary to fully equip units of 6 men, 15 men, and 25 men, respectively. These units are placed in caches at different ranger stations and are ready for speedy access. Enough equipment for 150 men in units of 6, 15, and 25 each is kept at park headquarters.

For obtaining better forecasts of fire weather danger, a fire weather meter for measuring the moisture content of twigs and ground litter has been installed at West Yellowstone. Daily humidity readings are also secured from West Yellowstone and Snake River. Data on fire weather danger is tabulated in the chief ranger's office daily throughout the fire season.

Severe lightning storms the latter part of the month produced many fires in remote areas. All but one of these were promptly detected and speedily suppressed. One fire, the Mirror Plateau fire, is believed to have been started on August 20 by lightning. It smoldered in a heavy stand of spruce and fir in a blind area for two days before a small visible column of smoke was followed within one hour by a severe blow up. The character of timber in which the fire originated, coupled with the long distance necessary to travel by foot before suppression work could be undertaken, allowed the fire to spread rapidly. The final area of the fire was estimated at 2,020 acres. Approximately 165 men were engaged in suppression work during the peak of the fire, which was under control after the third day. Rain and snow completely extinguished the fire one week after it was discovered. The experience gained in combating the numerous fires in 1931 was valuable in handling the Mirror Plateau fire and the work was accomplished with a minimum of expense.

Public utility operations.—While the operators were experiencing a bad financial year the service rendered by these utilities was good and few complaints were received, despite the fact that the crews were kept at a minimum.

Due to a poor season last year Roosevelt Lodge was not opened until July 1 and as little patronage was received at this lodge this year, the operations were discontinued on August 1. Lake Hotel and Sylvan Pass Lodge closed on July 15 while Lake Lodge ceased operations for the season on July 28. The remaining lodges closed on September 6, after Labor Day, and Old Faithful Inn, Canyon Hotel,

and Mammoth Hotel accommodated visitors to the end of the official season, September 19. The transportation line continued to operate until the latter date.

YOSEMITE NATIONAL PARK

Even those old-timers who have resided in Yosemite continuously from 30 to 50 years agree that this was the park's finest year. A record winter snowfall maintained the lakes and streams at high levels all summer. The meadows were lush and the waterfalls beautiful. Throughout the entire summer season temperatures were delightful, with pleasant sunny days and cool bracing evenings. The wild flower display was more lovely than for many years because of favorable weather conditions and a further restriction in the number of deer permitted to roam Yosemite Valley.

Fishing was better than ever before, and extensive fish-planting activities have been carried on to keep fishing in the lakes and streams in excellent condition. A total of 940,075 trout were distributed during the season of 1932.

In contrast to conditions prevailing in many travel centers, Yosemite enjoyed a record-breaking number of visitors. The total travel was 498,289, an increase of 7,859 over the former record of 490,430, established in 1927. Rail travel continued to decline and out-of-State travel was above the average of recent years, due in part to the fact that the Olympic games and the California parks combined to make a wonderful vacation. Thirty-six foreign parks were represented during the month of August alone. A careful 12-month special study revealed the interesting fact that 17 per cent of the out-of-State travel arrived in cars bearing California licenses. Due to economic conditions, as well as to the unusual attractiveness of Yosemite this year, there was a tendency for longer stays than for the past few years, particularly among campers.

Winter travel was 14 per cent above average. Winter sports were much more successful than for the three years preceding, due to the extraordinarily favorable snowfalls and temperatures. There is a gradually increasing public demand for winter recreation, but to assure success a ready means of access to altitudes of at least 7,000 feet must be found. We are carefully feeling our way with this winter sport experiment, as it is essential that the drawing power of the natural beauty of winter Yosemite is not confused with the clamor of possibly a comparatively few for winter sports.

Wawona addition.—On August 13, President Hoover proclaimed the addition of the Wawona Basin to Yosemite National Park, culminating the hopes and plans of years. The proclamation covered approximately 8,785 acres, of which 5,061 acres were public domain and 3,724 acres were in private ownership. Half of the purchase price of the private holdings along the road most important to its proper protection was donated and the Department of the Interior was authorized by Congress to match this donation with Federal funds. Total cost to the Government was \$188,300.

This acquisition unquestionably was the finest administrative improvement made in Yosemite since the federalization of the area. It brings into the park the full length of the new Wawona Highway

built at a total cost of approximately \$3,000,000; brings into our complete control all of the high country south of the Merced River; and greatly improves fire protection in this immense area, including the inestimable values represented by the Mariposa Grove of *Sequoia gigantea*. It also makes available in the park forms of recreation demanded by the public and yet not properly adaptable to Yosemite Valley. As time goes on it will preserve Yosemite Valley from overdevelopment because camp grounds, tourist cabin groups, and similar accommodations will be developed at Wawona. The quiet pastoral beauty of Wawona rounds out scenically the outstanding exhibits tapped—Yosemite Valley, the Mariposa Grove, and Wawona. The development of Wawona will be along lines that have distinguished this area since its homesteading by Galen Clark.

More land donated.—During the past year the Secretary accepted title to 640 acres of valuable timber land in the Yosemite National Park, through the generosity of George A. Ball, of Muncie, Ind., who purchased the tract and donated it to the Government. This section of land contains a magnificent stand of yellow pine, Jeffrey pine, some sugar pine, fir and cedar timber.

Hetch Hetchy.—This year the Hetch Hetchy situation was finally simplified. The city of San Francisco and the Department of the Interior entered into a signed agreement providing for the complete administrative control of the area by the National Park Service, the formal entry of the Public Health Service as advisor on watershed and reservoir protection, and the recognition by the city of San Francisco that its authority and responsibility include only the supervision of the dam mechanism, control of reservoir run-off and the supervision and domiciling of such employees as needed. Under this agreement the city of San Francisco does not hold the Park Service to use of the Raker Act road funds on the Crane Flat-Mather Ranger Station-Harden Lake road construction, but grants the Secretary of the Interior latitude permitting construction of other sections of the new Tioga Road. The Harden Lake route is of less public importance, so its construction may be deferred indefinitely. A first cash payment of \$250,000 by the city of San Francisco was applied this year on the Tioga Road section west from Tioga Pass. Four additional similar payments will be programmed at the discretion of the Secretary. Under this new agreement the city of San Francisco will no longer maintain any roads or trails in Yosemite. As it is expected that Hetch Hetchy water will flow through the city of San Francisco taps next year I feel gratified that all possible misunderstandings have been removed and the way cleared for excellent cooperation.

Road construction.—The 4,230-foot tunnel section of the Wawona Road was completed in August. The contract for paving this road through the tunnel and eastward to a junction with the valley road system was completed early in October, but the lighting and ventilating installations were not completed in time to permit autumn use. A contract was also let for macadamizing the balance of the new Wawona Road to Four Mile.

Grading of the first section of the new Glacier Point Road, from Chinquapin to Bridal Veil Meadows, was practically completed, and intensive studies and reconnaissance locations made of several possible routes for the balance of the road to Glacier Point. Especial consideration was given to the difficult problem of providing terminal

and parking facilities. The Yosemite advisory board cooperated in making these studies, and every effort was made to find the most suitable location for the road and parking space, from both the scenic and the public standpoints.

The Bureau of Public Roads completed its survey of the new scenic Tioga Road and the new route was approved. In the years to come it will bring marvelous Sierra views into the lives of millions of users. This route is also the best from an engineering standpoint as it shortens the distance and eliminates many long adverse grades. A national-park survey party has been studying the possibilities of locating a road at reasonable cost through the Tenaya Canyon to Tenaya Lake.

The State completed the reconstruction of the All-Year Highway on modern standards, and with Federal aid our Wawona Road was extended southward 6.2 miles. The State highway commission has recommended the reconstruction of the remaining gap of 18 miles leading into Fresno, which, with betterments now under way on the Ridge Route, will place southern California within eight to nine hours by motor from Yosemite throughout the year.

Ranger and ranger naturalist service.—This year there was an augmented interest in the facilities offered by the naturalist personnel, and a fine spontaneous appreciation. The Yosemite Museum was the center of an enormous total of educational activities and a complete new installation of exhibits at the Mariposa Grove Museum attracted many thousands. The library was in continuous use, and the cataloging of its volumes was continued by an expert librarian loaned by the Oakland Public Library. The session of the Yosemite School of Field Natural History was successful as heretofore. Nearly 300,000 people were contacted by the ranger-naturalists. The school for children was continued experimentally, and this innovation may readily grow into a large activity as it is highly regarded by parents.

Study of granite.—Studies of granite in the park were continued with the cooperation of the Carnegie Institution and tentative plans were made for the erection of an observation station on Sentinel Dome from which further studies could be made. The proposed observation station would not be an artificial structure, but rather an arrangement of large rocks upon which could be mounted the material needed to give visitors an outline of the history of granite.

Insect control.—A careful insect reconnaissance was made of the entire park, revealing that the insect menace to Yosemite's magnificent forests is grave and critical. It was hoped by entomologists that the long hard winter would result in a diminution of the insect hazard, but our all-summer reconnaissance reveals otherwise. Unless controlled before their natural emergence in the spring of next year, the insects seem certain to devastate a tragic proportion of the distinguished yellow pine and sugar pine stands of Yosemite.

Park operators.—Considering the general business conditions prevailing throughout the world, Yosemite operators were extremely fortunate. All of the smaller operators enjoyed business slightly above last year's level, and the decrease in volume with the Yosemite Park & Curry Co. was not as great as anticipated. Careful management leaves this company in a satisfactory financial situation and its directorate so confident of the future that it constructed a new \$35,000 unit in Mariposa Grove, consisting of cafeteria, dining room and out-

side dining terrace, and a 12-room lodge wing, to be supplemented by cabins as the future requires. This new building was erected in a subordinate redwood grove at Sunset Point, and on its completion the company completely eliminated all of its old tent houses and other structures from the main upper grove, thus accomplishing one of the outstanding landscape improvements in Yosemite this year.

ZION NATIONAL PARK

After several months of close observation and study by geologists and engineers, it was found necessary to perform supplemental construction in the Zion tunnel to strengthen structural weaknesses noted in the rock formation through which the tunnel was driven. The work is now in progress and will be completed in December.

The floor of the valley road grading project undertaken last season was completed on March 23. A contract was awarded for surfacing the road with rock and cut-back asphalt.

Only a small allotment could be made this year for continuing construction work to protect the valley road and lands from flood waters of the Virgin River. The funds were expended at the most critical points. Flood waters of August 27, which reached the highest stage of several years, did some damage at unprotected points, but at the same time proved the value of the protection work already in place.

The Utah Parks Co. continued its high standards of service at Zion Lodge. There was no impairment of service whatsoever in spite of discouraging returns. I can not commend the operator too highly for its spirit in maintaining excellent service in the face of losses. It is to be hoped that through the good will of the visitor thus earned the company will receive commensurate returns by a corresponding increase in patronage when times become better.

The public auto camp north of Zion Lodge was maintained in excellent condition throughout the season. There was an increase of approximately 15 per cent in the use of the grounds.

Much study was devoted to plans for the establishment of a cabin camp on the land at the south boundary purchased last year. It is hoped that next spring will see the construction of a unit to be placed in operation next season.

NATIONAL MONUMENTS

The establishment of the Bandelier and Great Sand Dunes National Monuments, listed under the section on southwestern monuments, brought the total number of monuments administered by the National Park Service to 36.

Developments in the national-monument field were perhaps greater than ever in a like period in the past. Particularly in this true in the historic and prehistoric field, as this phase of work is becoming increasingly popular.

Travel to the national monuments during the year just ended reached a total of 806,089, as compared with 392,011 for 1931.

The most outstanding events of the year are outlined briefly in the following sections:

THE SOUTHWESTERN MONUMENTS

The majority of the national monuments in the Southwest, mostly archeological in character, continued to be administered as a single unit under the direction of the superintendent of southwestern monuments. The Bandelier National Monument, New Mexico, which was transferred from the jurisdiction of the Forest Service to that of the National Park Service on February 25, 1932, and the Great Sand Dunes National Monument in Colorado, established March 17, were added to the southwestern group, which now numbers 19.

The Petrified Forest National Monument, formerly in the group supervised by the superintendent of southwestern monuments, was made an independent unit early in the summer.

A total of 102,342 visitors was recorded in these monuments this year. Exclusive of the Petrified Forest, the 1931 travel figure for these areas was 98,198.

Travel decreases in several of the monuments made it possible for the staff in charge of these monuments to devote more time to administrative matters, with the result that more important construction and many general improvements were accomplished. Aztec Ruins, Casa Grande, Chaco Canyon, El Morro, Gran Quivira, Montezuma Castle, Pipe Spring, and Tumacacori were especially benefited by general improvements such as the construction of badly needed buildings, road and trail improvements, and better camp grounds and water supply systems.

High morale of Southwestern personnel.—During my visit to the Southwest last summer I was tremendously impressed with the high morale of the Park Service personnel, both in the southwestern monuments and in the national parks of the locality. I can not speak too highly of the splendid work that is being done by the superintendents and custodians and their wives, and by the employees generally. These areas now are passing through a phase of development experienced earlier by the parks of the Pacific Coast and the Northwest regions. They are operating on a constantly expanding scale, from the standpoint of use and development, under totally inadequate finances, and in most cases are undermanned. The result is that the personnel—and this includes the many wives who devote hours of their time each day to assisting in Service work—is keenly alert, each trying to get \$2 worth of results for every \$1 of Federal funds expended.

Educational activities.—The educational program of this group of monuments was greatly enlarged. Museums are maintained at the following places: Aztec Ruins, Casa Grande, Chaco Canyon, Gran Quivira, and Montezuma Castle. New exhibits were added and display methods greatly improved. At Tumacacori an interesting museum collection will soon be on view in the priests' quarters of this old mission.

Nature guide service is furnished at Aztec Ruins, Casa Grande, Gran Quivira, Montezuma Castle, Pipe Spring, Tumacacori, Bandelier, Chaco Canyon, El Morro, and Natural Bridges. At the last four places this service is seasonal. The educational program for the southwestern monuments is still greatly handicapped by personnel limitations, but the worthwhile progress made in spite of this deficiency is highly gratifying.

COLONIAL

Though all travel statistics for Colonial National Monument are estimated because no checking stations have so far been established, it is clear that there is a keen public interest in this monument and heavy travel may be expected as its development progresses.

During October, 1931, which included the period of the sesquicentennial celebration of the surrender of the British forces at Yorktown, it was estimated that approximately 250,000 persons visited the monument, most of whom attended the 4-day sesquicentennial celebration which brought a throng of visitors, including the President, to Yorktown.

The acreage of Colonial National Monument was increased this year by the purchase of 133 acres; and the transfer from the Navy Department of 267 acres, 36 of which is submerged river land, in the Yorktown Battlefield area, and 331 acres for the Colonial Parkway. The total acreage of this monument is now 2,691.88 acres.

Work on the parkway, begun last year, has progressed to Station 578, including 5,700 feet of hydraulic fills. Upon the completion of three important bridges now under contract, funds are available for laying a hard surface. As soon as that is finished, 10 miles of this unusual parkway will be open to the public.

Extensive repairs were made on the Moore House and the Yorktown Hotel; and the Victory Monument at Yorktown, transferred to the National Park Service from the War Department, and the Tercentennial Monument at Jamestown, formerly under the Treasury Department, have been reconditioned.

A historical museum at the Moore House and a natural history museum at Monument Headquarters were opened this year, and lecture and guide trips inaugurated.

DEVILS TOWER

Improvements in camp grounds and parking space were made this year, and it is hoped that additional appropriations will permit the enlargement of facilities at this monument and the carrying forward of an adequate educational program. The bridge across the Belle Fourche River has received important repairs, but the eastern approach will require strengthening in the near future. The Wyoming State Highway Commission has designated as a State highway the road that is a feeder for Devils Tower. If this road is rebuilt, as now seems probable, travel to this monument will increase rapidly.

GEORGE WASHINGTON BIRTHPLACE

Much of the development program for the George Washington Birthplace National Monument in Virginia was completed in time to permit this monument to play an important part in the nation-wide bicentennial celebration of George Washington's birth. During the past year 65,154 persons made a pilgrimage to this shrine, and on February 22 special ceremonies, broadcast throughout the Nation, were held in the mansion. On February 11, Washington's birthday according to the old-style calendar, services were held in honor of the memory of Mrs. Josephine Wheelwright Rust, founder and first president of the Wakefield National Memorial Association, who died just as her work to save this old estate from oblivion was nearing fruition.

At dedication services held on May 14, the Wakefield National Memorial Association officially conveyed to the National Park Service its holdings in the monument, adding lands sufficient to bring the total area in possession of the Government up to approximately 395 acres.

In the Duck Hall area across an inlet from the mansion, a lodge for recreational purposes, constructed by the Wakefield National Memorial Association, is nearing completion, and two residences in the residential area and a footbridge have been constructed. This practically completed the major building program for this monument.

A small museum recently established in the ancient kitchen has received several important donations. A post office, officially designated as "Washington's Birthplace," was established this spring and a member of the Washington family residing in the neighborhood appointed postmistress. An unusual cancellation stamp, a small sketch of the mansion, attracts much attention from the public.

On February 16 Philip R. Hough was transferred from the Great Smoky Mountains National Park to Wakefield as its first permanent superintendent.

MUIR WOODS

Travel to this monument declined, 50,744 visitors being recorded this year as compared with 73,717 for 1931. The opening of the new Waldo-Alto section of the Redwood Highway last fall undoubtedly played a large part in bringing about a travel reduction. Before this new road was opened, both Muir Woods approach roads from the east joined directly with the Redwood Highway, but now these junction points are far to the side on narrow county roads.

An unknown disease appears to have wiped out the California gray squirrels which formerly were numerous in Muir Woods. Not a single live squirrel has been seen for several months.

As happened in other places, reduced travel left more time for maintenance work with the result that Muir Woods, at the close of this season, is in unusually good condition. As a result of the custodian's efforts, a group of unsightly buildings just outside the monument boundary was removed. Cooperation of this sort is greatly appreciated by the Park Service.

PETRIFIED FOREST

It is a pleasure to report that the Petrified Forest National Monument in Arizona is approaching the development and administrative status which its heavy travel warrants.

On June 16 it was removed from the group of southwestern monuments and made an independent unit under the immediate supervision of the director.

The two additions, totaling 67,300 acres, to this monument, bringing its total area to approximately 90,300 acres, and the completion of a bridge across the Río Puerco and 16 miles of graveled road through the monument have greatly added to its importance. It is expected that the road improvements will increase travel 100 per cent. An important development program, including new buildings and a splendid trail system, is nearing completion.

The unusual trail development and the establishment of museum exhibits have put the educational work at Petrified Forest on a very

satisfactory basis, and visitors are enthusiastic over the presentation of the natural wonders of this monument.

The addition of the Painted Desert area to the monument] by proclamation of the President on September 23, brought an exceedingly beautiful region and the unique petrified Black Forest into the monument system. This additional extension of 53,300 acres, 23,832 of which were already Government owned, will undoubtedly greatly increase the number of visitors to Petrified Forest.

CONCLUSION

The National Park Service during the past year—and, indeed, during the fifteen years of existence—has functioned effectively and progressively to protect and administer the national parks and monuments, and to advance their use by the American people.

In order that an even broader usefulness may be possible in the future, I make the following recommendations and sincerely urge their adoption:

1. Especially needed is the consolidation of all Federal park activities under the National Park Service, the bureau of the National Government established by law for this purpose. This would include the transfer of the national military parks and monuments as agreed upon for several years by the Secretaries of War and Interior.

2. Several existing national parks should have their boundaries rounded out to take in areas needed for administrative purposes, and more particularly to include priceless scenery, such as the Kings Canyon country of California and areas in the vicinity of the Grand Teton and Yellowstone National Parks. This subject is covered more fully in the section "Pending Boundary Problems," beginning on page 20.

3. The passage of the pending legislation for the creation of a national park trust fund board is considered extremely important, as it would give necessary authority for the administration of gifts or bequests of funds and securities, the income of which may be applied for the accomplishment of national-park purposes. There is no authority under existing law under which gifts of money and other property may be administered in this manner.

Respectfully submitted.

HORACE M. ALBRIGHT, *Director.*

APPENDIX A

ORGANIZATION OF THE NATIONAL PARK SERVICE

(Department of the Interior, Washington, D. C.)

Horace M. Albright, director.
Arno B. Cammerer, associate director.
A. E. Demaray, senior assistant director, branch of operations.
G. A. Moskey, assistant director, branch of lands and use.
Harold C. Bryant, assistant director, branch of research and education.
Conrad L. Wirth, assistant director, branch of planning.
Isabelle F. Story, editor, chief, division of public relations.
Charles L. Gable, chief auditor, park operators' accounts.
R. M. Holmes, chief clerk.
Everett E. Tillett, chief accountant.
Charles R. Brill, chief, mails and files.

FIELD SERVICE

WESTERN FIELD HEADQUARTERS

(409 Underwood Building, San Francisco, Calif.)

Frank A. Kittredge, chief engineer.
Thomas C. Vint, chief landscape architect.

FIELD EDUCATIONAL AND FORESTRY HEADQUARTERS

(333 Hilgard Hall, University of California, Berkeley, Calif.)

Ansel F. Hall, senior park naturalist and forester.
John D. Coffman, fire control expert.
Carl P. Russell, field naturalist.

WILD LIFE SURVEY

(213 Hilgard Hall, University of California, Berkeley, Calif.)

George M. Wright, park naturalist aid.
Joseph S. Dixon, field naturalist.
Ben H. Thompson, park naturalist aid.

EASTERN FIELD HEADQUARTERS

(Department of the Interior, Washington, D. C.)

Oliver G. Taylor, assistant chief engineer.
Charles E. Peterson, assistant chief landscape architect, Yorktown, Va.

FISH-CULTURAL INSPECTIONS AND ACTIVITIES

(P. O. Box 988, Salt Lake City, Utah)

Fred J. Foster, district supervisor, Bureau of Fisheries.

SANITARY ENGINEERING

(420 Call Building, San Francisco, Calif.)

H. B. Hommon, Sanitary Engineer, Public Health Service.

THE NATIONAL PARKS

Acadia, George B. Dorr, superintendent, Bar Harbor, Me.
Bryce Canyon, Preston P. Patraw, superintendent, Zion National Park, Utah.
Carlsbad Caverns, Thomas Boles, superintendent, Carlsbad, N. Mex.
Crater Lake, Elbert C. Solinsky, superintendent, Crater Lake, Oreg.

General Grant, John R. White, superintendent, Sequoia National Park, Calif.
 Glacier, Eivind T. Scoyen, superintendent, Belton, Mont.
 Grand Canyon, M. R. Tillotson, superintendent, Grand Canyon, Ariz.
 Grand Teton, Samuel T. Woodring, superintendent, Moose, Teton County, Wyo.
 Great Smoky Mountains, J. Ross Eakin, superintendent, Gatlinburg, via Sevier-ville, Tenn.
 Hawaii, Ernest P. Leavitt, superintendent, Hawaii National Park, Hawaii.
 Hot Springs, Thomas J. Allen, jr., superintendent, Hot Springs National Park, Arkansas.
 Lassen Volcanic, Lynne W. Collins, superintendent, Mineral, Calif.
 Mesa Verde, C. Marshall Finnan, superintendent, Mancos, Colo.
 Mount McKinley, Harry J. Liek, superintendent, McKinley Park, Alaska.
 Mount Rainier, Owen A. Tomlinson, superintendent, Longmire, Wash.
 Platt, William E. Branch, superintendent, Sulphur, Okla.
 Rocky Mountain, Edmund B. Rogers, superintendent, Estes Park, Colo.
 Sequoia, John R. White, superintendent, Sequoia National Park, Calif.
 Wind Cave, Edward D. Freeland, superintendent, Hot Springs, S. Dak.
 Yellowstone, Roger W. Toll, superintendent, Yellowstone Park, Wyo.
 Yosemite, Charles G. Thomson, superintendent, Yosemite National Park, Calif.
 Zion, Preston P. Patraw, superintendent, Zion National Park, Utah.

THE NATIONAL MONUMENTS

Frank Pinkley, superintendent, Southwestern Monuments, Coolidge, Ariz.¹
 Aztec Ruins, Johnwill Faris, custodian, Aztec, N. Mex.
 Capulin Mountain, Homer J. Farr, custodian, Capulin, N. Mex.
 Casa Grande, Hilding Palmer, custodian, Coolidge, Ariz.
 Chaco Canyon, Hurst Julian, acting custodian, Crownpoint, N. Mex.
 Colonial, William M. Robinson, jr., superintendent, Yorktown, Va.
 Craters of the Moon, Burton C. Lacombe, custodian, Arco, Idaho.
 Devils Tower, Newell F. Joyner, custodian, Devils Tower, Wyo.
 El Morro, Evon Z. Vogt, custodian, Ramah, N. Mex.
 George Washington Birthplace, Philip R. Hough, superintendent, Washington's Birthplace, Westmoreland County, Va.
 Gran Quivira, W. H. Smith, custodian, Gran Quivira, N. Mex.
 Montezuma Castle, Martin L. Jackson, custodian, Camp Verde, Ariz.
 Muir Woods, J. Barton Herschler, custodian, Mill Valley, Calif.
 Natural Bridges, Zeke Johnson, custodian, Blanding, Utah.
 Navajo, John Wetherill, custodian, Kayenta, Ariz.
 Petrified Forest, Charles J. Smith, superintendent, Holbrook, Ariz.
 Pinnacles, W. I. Hawkins, custodian, Hollister, Calif.
 Pipe Spring, Charles Leonard Heaton, acting custodian, Moccasin, Ariz.
 Scotts Bluff, A. N. Mathers, custodian, Gering, Nebr.
 Sitka, Peter Trierschild, custodian, Sitka, Alaska.
 Tumacaccri, George L. Boundey, custodian, Tubac, Ariz.
 Verendrye, Adolph Larsen, custodian, Sanish, N. Dak.

NOTE

The following national monuments have no local custodians:

Arches (Utah).	Hovenweep (Utah-Colorado).
Bandelier (New Mexico).	Katmai (Alaska).
Canyon de Chelly (Arizona).	Lewis and Clark Cavern (Montana).
Colorado (Colorado).	Rainbow Bridge (Utah).
Dinosaur (Utah).	Shoshone Cavern (Wyoming).
Fossil Cycad (South Dakota).	Wupatki (Arizona).
Glacier Bay (Alaska).	Yucca House (Colorado).
Great Sand Dunes (Colorado).	

¹ As superintendent of southwestern monuments, Mr. Pinkley is in charge of all monuments in New Mexico, Arizona, Colorado, and Utah, with the exception of the Petrified Forest, Dinosaur, and Colorado National Monuments. His headquarters are at Casa Grande National Monument, Coolidge, Ariz.

APPENDIX B

NATIONAL PARKS AND NATIONAL MONUMENTS ADMINISTERED BY VARIOUS FEDERAL DEPARTMENTS¹NATIONAL PARKS TABLE 1.—*National parks administered by the National Park Service, Department of the Interior*

[Number, 22; total area, 13,151.95 square miles or 8,417,261.53 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area (square miles)	Area (acres)	Total alien lands (acres)	Special characteristics
Acadia ² , 1919	Maine coast	Mount Desert Ferry, Me., Central system.	Feb. 26, 1919 Jan. 19, 1929 ³ May 23, 1930 ³	40 Stat. 1178 45 Stat. 1083 Pub. 248, 71st Cong.	18.53	11,859.32	-----	The group of granite mountains upon Mount Desert Island and also bold point on opposite mainland across Frenchmans Bay; formerly called the Lafayette National Park.
Bryce Canyon ² , 1928	Southwestern Utah.	Cedar City; Union Pacific system; Marysville, D. & R. G. W.	June 7, 1924 Feb. 25, 1928 ³ May 12, 1928 June 13, 1930 ³ Jan. 5, 1931 ³ Feb. 17, 1931 ³ May 4, 1931 ³	43 Stat. 533 45 Stat. 147 45 Stat. 502 Pub. 352, 71st Cong. Proc. 1930 Pub. 675, 71st Cong. Proc. 1952	55.06	35,240.08	-----	Box canyon filled with countless array of fantastically eroded pinnacles; best exhibit of vivid coloring of earth's materials.
Carlsbad Caverns, 1930	Southeastern New Mexico.	Carlsbad, Santa Fe system, Van Horn, Tex., & Pac.; El Paso, Alamogordo, and Carrizozo, Southern Pacific.	May 14, 1930	Pub. 216, 71st Cong.	1.12	719.22	-----	Contains stupendous caverns, not yet wholly explored, with magnificent limestone decorations.
Crater Lake ² , 1902	Southwestern Oregon.	Medford or Klamath Falls, Southern Pacific; Chiloquin, Great Northern and Southern Pacific.	May 22, 1902 May 14, 1932 ²	32 Stat. 302 Pub. 133, 72d Cong.	250.52	160,333.00	1,946.27	Lake of extraordinary blue in crater of extinct volcano; sides 1,000 feet high; interesting lava formations; fine fishing.
General Grant ² , 1890	Middle eastern California.	Fresno, Sanger, or Visalia, Santa Fe and Southern Pacific.	Oct. 1, 1890	26 Stat. 650	3.96	2,536.00	131.00	Created to preserve the celebrated General Grant Tree, and grove of Big Trees.

² General information circulars on these parks may be obtained free on application.³ Boundary changed.¹ Revised as of June 30, 1932.

NATIONAL PARKS TABLE 1.—*National parks administered by the National Park Service, Department of the Interior*—Continued

[Number, 22; total area, 13,151.95 square miles or 8,417,261.53 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area (square miles)	Area (acres)	Total alien lands (acres)	Special characteristics
Glacier ² 1910	North western Montana.	Glacier Park Station and Belton, Great Northern.	May 11, 1910	36 Stat. 354	1, 533.88	981, 681.00	16, 190.74	Rugged mountain region of unsurpassed alpine character; 250 glacier-fed lakes of romantic beauty; 60 small glaciers, precipices thousands of feet deep; sensational scenery of marked individuality; fine trout fishing.
Grand Canyon ² 1919	North central Arizona.	Grand Canyon Station Santa Fe system; North Rim, motor stage from Cedar City, Utah, Union Pacific; or from Marysvale, Utah, Denver & Rio Grande Western.	Feb. 26, 1919 Feb. 25, 1927 ³ Mar. 7, 1928 ³	40 Stat. 1175 44 Stat. 1238 45 Stat. 200-234.	1, 009.08	645, 808.79	25, 359.32	The greatest example of erosion and the most sublime spectacle in the world.
Grand Teton ² 1929	North western Wyoming.	Victor, Idaho, Oregon Short Line.	Feb. 26, 1929	45 Stat. 1314	150.00	96, 000.00	1, 294.50	Includes most spectacular portion of Teton Mountains, an uplift of unusual gradient.
Great Smoky Mountains. 1930	North Carolina and Tennessee.	Maryville, Knoxville & Augusta R. R. (Tenn.); Bryson, Southern R. R. (N. C.).	May 22, 1926	44 stat 616	465.18	297, 719.70	-----	This area is not to be developed as a national park until at least 427,000 acres have been donated to the United States, as specified in the organic act. Meanwhile the park area of 297,719.70 acres already in Federal ownership is being protected by the National Park Service.
Hawaii ² 1916	Hawaii	Interisland steamers from Honolulu.	Aug. 1, 1916 May 1, 1922 ³ Feb. 12, 1927 ³ Apr. 11, 1928 ³	39 Stat. 432 42 Stat. 503. 45 Stat. 424. 44 Stat. 1087.	245.00	156, 800.00	22.00	Interesting volcanic areas—Kilauea and Mauna Loa, active volcanoes on the island of Hawaii; Haleakala, a huge extinct volcano on the island of Maui.
Hot Springs ² 1921	Middle Arkansas	Hot Springs, Rock Island and Missouri Pacific systems.	Mar. 4, 1921 ⁴	41 Stat. 1407	1.45	927.00	-----	46 hot springs said to possess healing properties; many hotels and boarding houses; 19 bathhouses under Government supervision. Reserved by Congress in 1832 as the Hot Springs Reservation to prevent exploitation of hot waters.

Lassen Volcanic ? 1916	Northern California.	Red Bluff, Southern Pacific; Paxton, Western Pacific; Susanville, Southern Pacific.	Aug. 9, 1916 Apr. 26, 1928 ³ May 21, 1928 ³ Jan. 19, 1929 ³ Apr. 19, 1930 ³ July 3, 1930 ³	39 Stat. 442. 45 Stat. 466. 45 Stat. 644. 45 Stat. 1081. Pub. 148, 71st Cong. Pub. 507, 71st Cong.	163.32	104,526.61	2,906.40	Only active volcano in United States proper; Lassen Peak, 10,453 feet; cinder cone, 6,913 feet; hot springs, mud geysers.
Mesa Verde ? 1906	Southwestern Colorado.	Manecos, Denver & Rio Grande Western.	June 29, 1906 June 30, 1913 ³ May 27, 1932 ³	34 Stat. 616. 38 Stat. 82, 83, 84. Proc. 1998.	80.21	51,333.62	790.00	Most notable and best preserved prehistoric cliff dwellings in United States, if not in the world.
Mount McKinley ? 1917	South central Alaska.	McKinley Park Station, United States Alaska Railroad.	Feb. 20, 1917 Jan. 30, 1922 ³	39 Stat. 938. 42 Stat. 359.	3,030.46	1,939,493.00	320.00	Highest mountain in North America; rises higher above surrounding country than any other mountain in the world.
Mount Rainier ? 1899	West central Washington.	Ashford, Chicago, Milwaukee, St. Paul & Pacific.	Mar. 2, 1899 May 28, 1926 ³ Jan. 31, 1931 ³	30 Stat. 993. 44 Stat. 668. Pub. 584, 71st Cong.	377.78	241,782.00	1,212.99	Largest accessible single peak glacier system; 28 glaciers, some of large size; 48 square miles of glacier; 50 to 500 feet thick; wonderful subalpine wildflower fields.
Platt. 1902	Southern Oklahoma.	Sulphur, Santa Fe system and Frisco lines.	July 1, 1902 Apr. 21, 1904 ³ June 29, 1906	32 Stat. 641, 655. 33 Stat. 220. 34 Stat. 837.	1.32	848.31	-----	Sulphur and other springs said to possess healing properties.
Rocky Mountain ? 1915	North middle Colorado.	Longmont, Burlington Route and Colorado & Southern; Loveland, Colorado & Southern; Lyons, Burlington Route; Boulder, Denver Interurban and Colorado & Southern; Fort Collins, Union Pacific and Colorado & Southern; Granby, Denver & Salt Lake.	Jan. 26, 1915 Feb. 14, 1917 ³ June 2, 1924 ³ June 9, 1926 ³ June 21, 1930 ³ July 17, 1930 ³	38 Stat. 798. 39 Stat. 916. 43 Stat. 252. 44 Stat. 712. Pub. 404, 71st Cong. Proc. 1917.	405.33	259,411.00	7,606.70	Heart of the Rockies; snowy range, peaks 11,000 to 14,255 feet altitude; remarkable records of glacial period.
Sequoia ? 1890	Middle eastern California.	Exeter or Visalia, Santa Fe and Southern Pacific.	Sept. 25, 1890 Oct. 1, 1890 ³ July 3, 1926 ³	26 Stat. 478. 26 Stat. 650. 44 Stat. (pt. 2) 818.	604.00	386,560.00	1,642.97	The Big Tree National Park; scores of sequoias 20 to 30 feet in diameter, thousands over 10 feet in diameter; General Sherman Tree, 36.5 feet in diameter and 272.4 feet high; towering mountain ranges; starting precipices; Mount Whitney and Kern River Canyon.
Wind Cave ? 1903	South Dakota.	Hot Springs, Burlington Route and Chicago & North Western.	Jan. 9, 1903 Mar. 4, 1931 ³ Mar. 19, 1932 ³	32 Stat. 765. Pub. 843, 71st Cong. Pub. 63, 72d Cong.	19.06	12,195.77	-----	Cavern having several miles of galleries and numerous chambers containing peculiar formations.

³ Boundary changed.

² General information circulars on these parks may be obtained free on application.

NATIONAL PARKS TABLE 1.—*National parks administered by the National Park Service, Department of the Interior*—Continued

[Number, 22; total area, 13,151.95 square miles or 8,417,261.53 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area (square miles)	Area (acres)	Total alien lands (acres)	Special characteristics
Yellowstone ² 1872	Northwestern Wyoming, southwestern Montana, and northeastern Idaho.	Gardiner, Mont., Northern Pacific; West Yellowstone, Mont., Union Pacific; Cody, Wyo., Burlington Route; Lander, Wyo., Chicago & North Western; Three Forks, Mont., Chicago, Milwaukee, St. Paul & Pacific.	Mar. 1, 1872 Mar. 1, 1929 ³	17 Stat. 32, 33. 45 Stat. 1435.	43,426.00	2,192,640.00	6,598.20	More geysers than in all rest of world together; boiling springs; mud volcanoes; petrified forests; Grand Canyon of the Yellowstone, remarkable for gorgeous coloring; large lakes; many large streams and waterfalls; vast wilderness, one of the greatest wild bird and animal preserves in the world; exceptional trout fishing.
Yosemite ² 1890	Middle eastern California.	Merced, Southern Pacific and Santa Fe; thence Yosemite Valley R. R. to El Portal.	Oct. 1, 1890 ³ Feb. 7, 1905 ³ June 11, 1906 ³ May 28, 1928 ³ Mar. 12, 1929 ³ Apr. 14, 1930 ³	26 Stat. 650. 33 Stat. 702. 34 Stat. 831. 45 Stat. 787. 45 Stat. 1486. Proc. 1904.	1,162.43	743,959.38	2,531.65	Valley of world-famed beauty; lofty cliffs; romantic vistas; many waterfalls of extraordinary height; 3 groves of Big Trees; High Sierra, Waterwheel Falls; good trout fishing.
Zion ² 1919	Southwestern Utah.	Cedar City, Union Pacific system; Marysville, Denver & Rio Grande Western.	Nov. 19, 1919 June 13, 1930 ³	41 Stat. 356. Pub. 351, 71st Cong.	148.26	94,887.73	1,161.73	Magnificent gorge (Zion Canyon); depth from 1,500 to 2,500 feet, with precipitous walls; of great beauty and scenic interest.

² General information circulars on these parks may be obtained free on application.³ Boundary changed.⁴ In Wyoming, 3,139 square miles; in Montana, 240 square miles; in Idaho 47 square miles.

NATIONAL PARKS TABLE 2.—*National monuments administered by the National Park Service, Department of the Interior*¹

[Number, 36; total area, 6,509.80 square miles or 4,166,269.74 acres]

Name	Location	Approaches	When established	Statute reference	Area (acres)	Total alien lands (acres)	Special characteristics
Arches	Utah	Thompson, Rio Grande Western-U. S. 450 to monument.	Apr. 12, 1929	Proc. 1875	4,520.00	320.00	Contains extraordinary examples of wind erosion in the shape of gigantic arches, windows, and other unique formations.
Aztec Ruins ²	New Mexico	Aztec, Denver & Rio Grande Western.	Jan. 24, 1923 July 2, 1928 ³ Dec. 19, 1930 ³	42 Stat. 2295 45 Stat. 2954 Proc. 1928	25.88		Prehistoric ruin of pueblo type containing 500 rooms and other ruins.
Bandelier	New Mexico	Santa Fe, Santa Fe system and Denver & Rio Grande Western.	Feb. 25, 1932	Proc. 1991	26,026.20		Vast number of cliff-dweller ruins of unusual ethnological and educational interest, including ruins of Rito de los Frijoles, Otowi, Tsankawi, and others. Some of the tools, implements, and simple household equipment of the former inhabitants have been restored as they were centuries ago.
Canyon de Chelly	Arizona	Gallup, Santa Fe system	Apr. 1, 1931	Proc. 1945	83,840.00		Many cliff dwellings in caves and crevasses containing records of cultural progress covering longer period than any other ruins discovered in Southwest. 20-mile box canyon joined by lateral canyon. Walls of red sandstone from 700 to 1,000 feet high.
Capulin Mountain	New Mexico	Folsom, Colorado & Southern.	Aug. 9, 1916	39 Stat. 1792	680.37		Cinder cone of geologically recent formation.
Casa Grande	Arizona	Florencia, Southern Pacific	Mar. 2, 1889 June 22, 1892 ⁴ Dec. 10, 1909 Aug. 3, 1918 June 7, 1926 ³	25 Stat. 961 Ex. order 36 Stat. 2504 40 Stat. 1818 44 Stat. 698	472.50		These ruins are one of the most noteworthy relics of a prehistoric age and people within the limits of the United States. Discovered in 1694.
Chaco Canyon	New Mexico	Thoreau, Santa Fe system	Mar. 11, 1907 Jan. 10, 1928 ³	35 Stat. 2119 45 Stat. 2387	521,512.37	10,266.24	Numerous cliff-dweller ruins, including communal houses, in good condition and but little excavated.

¹ Revised as of June 30, 1932.² Donated to United States.³ Boundary changed.⁴ From June 22, 1892, until Aug. 3, 1918, classified as a national park.⁵ Estimated.

NATIONAL PARKS TABLE 2.—*National monuments administered by the National Park Service, Department of the Interior*—Continued

[Number, 36; total area, 6,509.80 square miles or 4,166,269.74 acres]

Name	Location	Approaches	When established	Statute reference	Area (acres)	Total alien lands (acres)	Special characteristics
Colonial.....	Virginia.....	Williamsburg or Lee Hall, Chesapeake & Ohio R. R.	Dec. 30, 1930 ⁶	Proc. 1929.....	2, 375. 69	-----	Three areas of great historic importance with connecting parkway—Jamestown Island, where first permanent English settlement in America was made in 1607; Williamsburg, seat of government of Colonial Virginia for nearly a century; and Yorktown, scene of the culminating battle of the Revolution.
Colorado.....	Colorado.....	Grand Junction, Denver & Rio Grande Western.	May 24, 1911	37 Stat. 1681.....	13, 749. 47	-----	Many lofty monoliths; is wonderful example of erosion, and of great scenic beauty and interest.
Craters of the Moon.....	Idaho.....	Arco, Oregon Short Line.....	May 2, 1924 July 23, 1928 ³ July 9, 1930 ³	43 Stat. 1947..... 45 Stat. 2959. Proc. 1916.	49, 601. 90	1, 573. 96	Best examples of fissure lava flows; volcanic region with weird landscape effects.
Devils Tower.....	Wyoming.....	Moorecroft, Burlington Route	Sept. 24, 1906	34 Stat. 3236.....	1, 152. 91	-----	Remarkable natural rock tower, of volcanic origin, 1,200 feet in height.
Dinosaur.....	Utah.....	Watson, Uintah Ry.....	Oct. 4, 1915	39 Stat. 1752.....	80. 00	-----	Deposits of fossil remains of prehistoric animal life of great scientific interest.
El Morro.....	New Mexico.....	Gallup or Grant, Santa Fe system.	Dec. 8, 1906 June 18, 1917 ³	34 Stat. 3264..... 40 Stat. 1673.	240. 00	-----	Enormous sandstone rock eroded in form of a castle, upon which inscriptions have been placed by early Spanish explorers. Contains cliff-dweller ruins. Of great historic, scenic, and ethnologic interest.
Fossil Cycad.....	South Dakota.....	Minnehaha, Chicago, Burlington & Quincy.	Oct. 21, 1922	42 Stat. 2286.....	320. 00	-----	Area containing deposits of plant fossils.
George Washington Birthplace.....	Virginia.....	Fredericksburg; Richmond, Fredericksburg & Potomac, thence State route No. 37 to monument.	Jan. 23, 1930	Pub., No. 34, 71st Cong.	394. 47	-----	Site of home in which George Washington was born rehabilitated and replica of the old homestead erected.
Glacier Bay.....	Alaska.....	Juneau, by boat.....	Feb. 26, 1925	43 Stat. 1989.....	1, 164, 800. 00	-----	Contains tidewater glaciers of first rank.
Gran Quivira.....	New Mexico.....	Mountainair, Santa Fe system.	Nov. 1, 1909 Nov. 25, 1919 ³	36 Stat. 2503..... 41 Stat. 1778.	610. 94	-----	One of the most important of earliest Spanish mission ruins in the Southwest. Monument also contains pueblo ruins.

Great Sand Dunes	Colorado	Mosca, Denver & Rio Grande Western.	Mar. 17, 1932	Proc. 1934	46,034.00	12,000.00	Contains picturesque Great Sand Dunes of the San Luis Valley which are among the largest and highest, if not the greatest, of any sand dunes in the United States. Four groups of prehistoric towers, pueblos, and cliff dwellings. Wonderland of great scientific interest in the study of volcanism. Phenomena exist upon a scale of great magnitude. Includes Valley of Ten Thousand Smokes.
Hovenweep	Utah and Colorado.	Mancos, Denver & Rio Grande Western.	Mar. 2, 1923	42 Stat. 2299	285.80		
Katmai	Alaska	Sailing vessel from Kodiak, reached by steamship from Seattle.	Sept. 24, 1918 Sept. 5, 1923 Apr. 24, 1931 ³	40 Stat. 1855 Ex. Order No. 3897. Ex. Order No. 1950.	2,697,590.00		
Lewis and Clark Cavern. ²	Montana	Temporarily closed to public.	May 11, 1908 May 16, 1911	35 Stat. 2187 37 Stat. 1679.	160.00		Immense limestone cavern of great scientific interest, magnificently decorated with stalactite formations. Now closed to public because of depredations by vandals. Prehistoric cliff-dwelling ruin of unusual size situated in a niche in face of a vertical cliff. Of scenic and ethnologic interest.
Montezuma Castle	Arizona	Clarkdale, Santa Fe system.	Dec. 8, 1906	34 Stat. 3265	\$ 160.00		One of the most noted redwood groves in California, and was donated by the late Hon. William Kent, ex-Member of Congress. Located 7 miles from San Francisco.
Muir Woods ²	California	Ferry from San Francisco, thence Mount Tamalpais & Muir Woods R. R.	Jan. 9, 1908 Sept. 22, 1921 ³	35 Stat. 2174 42 Stat. 2249.	426.43		Three natural bridges, among largest examples of their kind. Largest bridge is 222 feet high, 65 feet thick at top of arch; arch is 28 feet wide; span, 261 feet; height of span, 157 feet. Other two slightly smaller. Contains numerous pueblo, or cliff-dweller ruins, in good preservation.
Natural Bridges	Utah	Pack trip from Blanding, Utah, reached by stage from Thompson, Utah, Mancos, Colo., stations on Denver & Rio Grande Western.	Apr. 16, 1908 Sept. 25, 1909 Feb. 11, 1916	35 Stat. 2183 36 Stat. 2502. 39 Stat. 1764.	\$ 2,740.00		Abundance of petrified coniferous trees, one of which forms a small natural bridge. Is of great scientific interest.
Navajo	Arizona	Gallup, N. Mex. or Flagstaff, Ariz., Santa Fe system.	Mar. 20, 1909 Mar. 14, 1912	36 Stat. 2491 37 Stat. 1733.	360.00		
Petrified Forest	do	Adamana or Holbrook, Santa Fe system.	Dec. 8, 1906 July 31, 1911 ³ Nov. 14, 1930 ³ Nov. 30, 1931 ³	34 Stat. 3266 37 Stat. 1716. Proc. 1927. Proc. 1975.	36,983.37	8,370.00	
Pinnacles	California	Soledad or Hollister, Southern Pacific.	Jan. 16, 1908 May 7, 1923 ³ July 2, 1924 ³ Apr. 13, 1931 ³	35 Stat. 2177 43 Stat. 1911. 43 Stat. 1961. Proc. 1948.	4,906.61	160.00	Many spirelike rock formations, 600 to 1,000 feet high, visible many miles; also numerous caves and other formations.
Pipe Spring	Arizona	Cedar City, Utah, Union Pacific.	May 31, 1923	43 Stat. 1913	40.00		Old stone fort and spring of pure water in desert region. Serves as memorial to early western pioneer life.

² Present boundary not yet definitely determined.³ Estimated.³ Boundary changed.² Donated to United States.

NATIONAL PARKS TABLE 2.—*National monuments administered by the National Park Service, Department of the Interior*—Continued

[Number, 36; total area, 6,509.80 square miles or 4,166,269.74 acres]

Name	Location	Approaches	When established	Statute reference	Area (acres)	Total alien lands (acres)	Special characteristics
Rainbow Bridge	Utah	Pack trip from Navajo Mountain, Ariz., reached from Gallup, N. Mex., or Flagstaff, Ariz., Santa Fe system.	May 30, 1910	36 Stat. 2703	160.00	—	Unique natural bridge of great scientific interest and symmetry. Height 309 feet above water, and span is 278 feet, in shape of rainbow.
Scotts Bluff	Nebraska	Gering, Union Pacific	Dec. 12, 1919 May 9, 1924 ² June 1, 1932 ²	41 Stat. 1779 Ex. Order No. 4008. Proc. 1999.	3, 240.09	2, 313.62	Region of historic and scientific interest. Many famous old trails traversed by the early pioneers in the winning of the West passed over and through this monument.
Shoshone Cavern	Wyoming	Cody, Burlington route	Sept. 21, 1909	36 Stat. 2501	210.00	—	Cavern of considerable extent, near Cody, not open to visitors at present.
Sitka	Alaska	Port of call for steamships from Seattle.	Mar. 23, 1910	36 Stat. 2601	57.00	—	Area of great natural beauty and historic interest as scene of massacre of Russians by Indians. Contains 16 totem poles of best native workmanship.
Tumacacori	Arizona	Calabasas, Southern Pacific and El Paso & Southern.	Sept. 15, 1908	35 Stat. 2205	10.00	—	Ruin of Franciscan mission dating from seventeenth century. Being restored by National Park Service as rapidly as funds permit.
Verendrye	North Dakota	Sanish, Soo Line	June 29, 1917	40 Stat. 1677	250.04	248.04	Includes Crowhign Butte, from which Explorer Verendrye first beheld territory beyond the Missouri River.
Wupatki	Arizona	Flagstaff, Santa Fe system	Dec. 9, 1924	43 Stat. 1977	2, 234.10	320.00	Prehistoric dwellings of ancestors of Hopi Indians.
Yucca House ²	Colorado	Mancos, Denver & Rio Grande Western.	Dec. 19, 1919	41 Stat. 1781	9.60	—	Located on eastern slope of Sleeping Ute Mountain. Is pile of masonry of great archeological value, relic of prehistoric inhabitants.

² Donated to United States.

* Boundary changed.

NATIONAL PARKS TABLE 3.—*National monuments administered by the Department of Agriculture*¹

[Number, 15; total area, 561.11 square miles or 359,110 acres]

Name	Location	Approaches	When established	Statute reference	Area (acres)	Special characteristics
Chiricahua.....	Arizona.....	Wilcox, Southern Pacific.....	Apr. 18, 1924	43 Stat. 1946.....	4,480	Natural rock formations—pillars, balanced rocks, and formations resembling animals, faces, etc. Consists of peculiar hexagonal basaltic columns, like an immense pile of posts. The columns lie in the pile at all angles from vertical to almost horizontal. Said to rank with famous Giant's Causeway of Ireland.
Devils Postpile.....	California.....	Laws, Southern Pacific, thence stage to Mammoth.	July 6, 1911	37 Stat. 1715.....	800	
Gila Cliff Dwellings.....	New Mexico.....	Silver City, via Pinos Altos, Santa Fe system.	Nov. 16, 1907	35 Stat. 2162.....	160	Cliff-dweller ruins. Four natural cavities in the face of an overhanging cliff 150 feet high, of a grayish-yellow volcanic formation, are divided into small rooms by walls built of adobe and small stones, which are in a good state of preservation. The ruins are situated in a rough and broken country and are accessible only by trail. 2 crevices on side of Mount of the Holy Cross, which when filled, or partially filled, with snow form a figure in the shape of a Greek cross.
Holy Cross.....	Colorado.....	Redcliff, Denver & Rio Grande....	May 11, 1929	Proc. 1877.....	1,392	Object of much public and religious interest. Cavern of limestone formation. Consists of a series of chambers, connected by narrow passages, with numerous side galleries.
Jewel Cave.....	South Dakota.....	Custer, Burlington route.....	Feb. 7, 1908	35 Stat. 2180.....	21,280	Unusual and unique exhibits of volcanic action and lava flows in the shape of peculiar lava caves and tunnels in great numbers and of considerable size. In many of these caves rivers of perpetual ice are found and Indian petroglyphs carved and painted upon their walls indicate possible occupancy by early historic and prehistoric races. Battle ground of Modoc Indian war of 1873.
Lava Beds.....	California.....	Mount Hebron, Southern Pacific....	Nov. 21, 1925	44 Stat. 2591.....	45,967	Caves of light-gray and white limestone, honey-combed by tunnels and galleries of stalactite formations.
Lehman Caves.....	Nevada.....	Ely, Nevada Northern.....	Jan. 24, 1922	42 Stat. 2260.....	593	

¹ Information regarding these national monuments was furnished by the Department of Agriculture.² Estimated.

NATIONAL PARKS TABLE 3.—*National monuments administered by the Department of Agriculture*—Continued

(Number, 15; total area, 561.11 square miles or 359,110 acres)

Name	Location	Approaches	When established	Statute reference	Area (acres)	Special characteristics
Mount Olympus	Washington	Port Angeles by ferry from Seattle.	Mar. 2, 1909 Apr. 17, 1912 May 11, 1915	35 Stat. 2247 37 Stat. 1737 39 Stat. 1726	298, 730	Contains many objects of unusual scientific interest, including numerous glaciers. It is a real wilderness area, having no settlements, no supply points, nor human habitations within it. Bands of the rare Roosevelt elk, numbering several thousand head, of a species native to the region and not found elsewhere, have their summer feeding grounds within the monument area.
Old Kasaan	Alaska	Steamships, Seattle to Ketchikan.	Oct. 25, 1916	39 Stat. 1812	38	Abandoned Haida Indian village in which remain totem poles, grave houses and monuments, and portions of the original framework of the buildings.
Oregon Caves	Oregon	Grants Pass, Southern Pacific	July 12, 1909	36 Stat. 2497	480	Caves in limestone formation of great variety and beauty. These assume odd, grotesque, and fantastic forms of considerable extent and are situated in an attractive environment.
Sunset Crater	Arizona	Flagstaff, Santa Fe system	May 26, 1930	Proc. No. 1911	3, 040	A volcanic crater with lava flows and ice caves, near famous San Francisco Peaks.
Timpanogos Cave	Utah	American Fork, Union Pacific system; Denver & Rio Grande Western.	Oct. 14, 1922	42 Stat. 2285	250	Limestone cavern. The cave is almost 600 feet in length. Many beautiful effects are emphasized by the electric lights installed in the cave.
Tonto	Arizona	Globe, Southern Pacific	Dec. 19, 1907	35 Stat. 2168	2 640	Two cliff-dweller ruins just off the Roosevelt Globe Highway, one to the southwest of the road and the other on the west side of the canyon. They consist of 2 and 3 storied walls of adobe with the supporting beams and lintels of windows and low doors still in place.
Walnut Canyon	do	Flagstaff, Santa Fe system	Nov. 30, 1915	39 Stat. 1761	960	Contains cliff dwellings of marked scientific and popular interest built in under the outward sloping canyon walls, utilizing the projecting limestone ledges as foundations. Instead of being of the communal type, these cliff houses were apparently built for separate families and contain from 6 to 8 rooms.
Wheeler	Colorado	Wagon Wheel Gap or Creede, Denver & Rio Grande Western.	Dec. 7, 1908	35 Stat. 2214	300	Volcanic formations of unusual scientific interest as illustrating erratic erosion. Unusual combination of fantastic pinnacles and interesting gorges.

2 Estimated.

NATIONAL PARKS TABLE 4.—*National monuments administered by the War Department*¹

[Number, 24; total area, 1,197.10 acres]

Name	Location	Approaches	When established	Statute reference	Area (acres)	Special characteristics
Abraham Lincoln's Birthplace Memorial.	Kentucky.....	Hodgenville, Illinois Central.....	July 17, 1916	39 Stat. 385.....	110.00	Contains the log cabin and part of the farm where Abraham Lincoln was born.
Appomattox	Virginia.....	Appomattox, Norfolk & Western.....	June 18, 1930	46 Stat. 777.....	2.00	Monument commemorating the termination of the war between the States on Apr. 9, 1865.
Big Hole Battlefield.....	Montana.....	Divide, Union Pacific.....	June 23, 1910	Ex. Order 1216.....	5.00	Site of battlefield on which battle was fought Aug. 9, 1877, between a small force of United States troops and a much larger force of Nez Percé Indians, resulting in rout for the Indians.
Brices Cross Roads.....	Mississippi.....	Baldwyn, Mobile & Ohio.....	Feb. 21, 1929	45 Stat. 1254.....	1.00	Civil War Battle of Brices Cross Roads—June 10, 1864.
Cabrillo.....	California.....	San Diego, Southern Pacific and Santa Fe.	Oct. 14, 1913 May 12, 1926	38 Stat. 1965..... 44 Stat. 2612.	.50	Of historic interest because of discovery of the territory now partly embraced in the State of California by Juan Rodriguez Cabrillo, who at this point first sighted land on Sept. 28, 1542.
Camp Blount Tablets.....	Tennessee.....	Fayetteville, Nashville, Chattanooga & St. Louis.	June 23, 1930	Act.....	None.	Site of old Stone Bridge, marking site of mobilization and camps of troops under Gen. Andrew Jackson, preparatory to war against the Spanish and Indians in Florida.
Castle Pinckney.....	South Carolina.....	Charleston, Atlantic Coast Line, Seaboard Air Line, Southern.	Oct. 15, 1924	43 Stat. 1968.....	3.50	Fortification built in 1810 to replace a Revolutionary fort.
Chalmette.....	Louisiana.....	New Orleans, Southern & Nashville Pacific; Louisville & Nashville.	Mar. 4, 1907 June 2, 1930	34 Stat. 1411..... Act.	15.00	Erected in memory of the Battle of New Orleans, which was fought on Jan. 8, 1815.
Cowpens.....	South Carolina.....	Cowpens, Southern.....	Mar. 4, 1929	45 Stat. 1558.....	1.00	Site of Revolutionary War Battle of Cowpens, Jan. 17, 1781.
Fort Marion.....	Florida.....	St. Augustine, Florida East Coast.....	Oct. 15, 1924	43 Stat. 1968.....	18.09	Fort built by Spaniards in 1656.
Fort Matanzas.....	do.....	do.....	do.....	do.....	1.00	Relic of Spanish invasion.
Fort McHenry.....	Maryland.....	Baltimore, Pennsylvania; Baltimore & Ohio; Washington, Baltimore & Annapolis.	Mar. 3, 1925	43 Stat. 1109.....	47.00	Restored and preserved as birthplace of "Star-Spangled Banner."
Fort Necessity.....	Pennsylvania.....	Uniontown, Baltimore & Ohio.....	Mar. 4, 1931	Act.....	2.00	Monument commemorating the Battle of Fort Necessity between troops under Maj. George Washington and French and Indian troops, July 3, 1757.
Fort Niagara.....	New York.....	Lewiston, New York Central.....	Sept. 5, 1925	44 Stat. 2582.....	.0074	Site for erection of cross to commemorate a cross erected by Father Millet in 1688 on what is now the Fort Niagara Military Reservation.
Fort Pulaski.....	Georgia.....	Pulaski, Central of Georgia.....	Oct. 15, 1924	43 Stat. 1968.....	20.00	Built in 1810 to replace Fort Greene of the Revolution.

¹ Information regarding these national monuments was furnished by the War Department.

NATIONAL PARKS TABLE 4.—*National monuments administered by the War Department*—Continued

[Number, 24; total area, 1,197.10 acres]

Name	Location	Approaches	When established	Statute reference	Area (acres)	Special characteristics
Fort Wood.....	New York.....	New York City.....	Oct. 15, 1924	43 Stat. 1968. 39 Stat. 901.	2.50	Site of the Statue of Liberty.
Kenesaw Mountain.....	Georgia.....	Marietta, Nashville, Chattanooga & St. Louis.	Feb. 8, 1917	-----	60.00	Site of important Civil War engagement fought June 27, 1864.
Kitty Hawk.....	North Carolina.....	Elizabeth City, Norfolk Southern.	Mar. 2, 1927	44 Stat. 1264.	547.00	Scene of first sustained flight by heavier-than-air machine.
Mertwether Lewis.....	Tennessee.....	Hohenwald, Nashville, Chattanooga & St. Louis.	Feb. 6, 1925	43 Stat. 1986.	300.00	Contains grave of Captain Lewis of the Lewis and Clark Expedition.
Monocacy.....	Maryland.....	Near Frederick, Baltimore & Ohio and Pennsylvania.	Dec. 6, 1927 Mar. 1, 1929	Proc. 45 Stat. 1444.	1.00	Site of Civil War Battle of Monocacy.
Mound City Group.....	Ohio.....	Chillicothe, Baltimore & Ohio and Norfolk & Western.	Mar. 9, 1923	42 Stat. 2298.	57.00	Famous group of prehistoric mounds in Camp Sherman Military Reservation.
New Echota.....	Georgia.....	Echota, Nashville, Chattanooga & St. Louis.	May 28, 1931	46 Stat. 431.	1.00	Site of Capitol of Cherokee Indians.
Tupelo.....	Mississippi.....	Baldwyn, Mobile & Ohio.	Feb. 21, 1929	45 Stat. 1254.	1.00	Commemorates the Battle of Tupelo.
White Plains Battlefield.....	New York.....	White Plains, New York Central.	May 18, 1926	44 Stat. 562.	None.	Memorial tablet to indicate the position of the Revolutionary Army under the command of General Washington.

NATIONAL PARKS TABLE 5.—*National military and other parks administered by the War Department*¹

[Number, 12; total area, 21.62 square miles or 13,801 acres]

Name	Location	Nearest rail stations	When established	Statute reference	Area (acres)	Special characteristics
Antietam Battlefield.....	Maryland.....	Antietam, Norfolk & Western.....	Aug. 30, 1890	26 Stat. 401.....	40.00	Scene of one of the greatest battles of the Civil War.
Chickamauga and Chattanooga.....	Georgia and Tennessee.....	Chattanooga, Nashville, Chattanooga & St. Louis; Central of Georgia; Southern.	Aug. 19, 1890	26 Stat. 333.....	5,733.00	Beautiful natural park; embraces battlefields of Chickamauga and Missionary Ridge, and scenes of other conflicts of the Civil War fought in the vicinity of Chattanooga during 1863.
Fredericksburg and Spotsylvania.....	Virginia.....	Fredericksburg, Richmond, Fredericksburg & Potomac.	Feb. 14, 1927	44 Stat. 1091.....	None.	Scene of battles of Fredericksburg, Spotsylvania, Wilderness, Chancellorsville, and Salem Church at or near Fredericksburg.
Fort Donelson.....	Tennessee.....	Erin, Louisville & Nashville.....	Mar. 26, 1928	45 Stat. 367.....	108.00	Site of Civil War fort; now military cemetery.
Gettysburg ²	Pennsylvania.....	Gettysburg, Philadelphia & Reading, Western Maryland.	Feb. 11, 1895	28 Stat. 651.....	2,530.00	Beautiful natural park; scene of Civil War combat; probably better marked than any other battlefield in the world.
Guilford Courthouse.....	North Carolina.....	Greensboro, Southern and Atlantic & Yadkin.	Mar. 2, 1917	39 Stat. 996.....	110.00	Near Greensboro; scene of one of the great battles of the Revolution; fought in 1781.
Kings Mountain.....	South Carolina.....	Kings Mountain, Southern.....	Mar. 3, 1931	Act.....	-----	Commemorating the Revolutionary War Battle of Kings Mountain fought at this place Oct. 7, 1780.
Moore's Creek.....	North Carolina.....	Burgaw, Atlantic Coast Line.....	June 2, 1926	44 Stat. 684.....	30.00	Scene of one of most memorable battles of Revolutionary War.
Petersburg.....	Virginia.....	Petersburg, Seaboard Air Line, Atlantic Coast Line, and Norfolk & Western.	July 3, 1926	44 Stat. 822.....	None.	Scene of campaign and siege and defense of Petersburg, Va., in 1864 and 1865.
Shiloh.....	Tennessee.....	Corinth, Miss., Illinois Central and Southern.	Dec. 27, 1894	28 Stat. 597.....	3,583.00	Natural park embracing the battlefield of Shiloh near Pittsburgh Landing.
Stones River.....	do.....	Murfreesboro, Nashville, Chattanooga & St. Louis.	Mar. 3, 1927	44 Stat. 1399.....	345.00	Scene of the Battle of Stones River in Tennessee.
Vicksburg.....	Mississippi.....	Vicksburg, Alabama & Vicksburg; Vicksburg, Shreveport & Pacific; and Yazoo & Mississippi Valley.	Feb. 21, 1899	30 Stat. 841.....	1,322.00	Beautiful natural park; scene of the siege and surrender of Vicksburg in 1863 during the Civil War.

¹ Information regarding these military and other parks was furnished by the War Department.² Donated in whole or in part to the United States.

NATIONAL PARKS TABLE 6.—*Holdings acquired by deed for national park and monument purposes*

Parks and monuments	Holdings acquired from July 1, 1931, through June 30, 1932						Total holdings acquired through June 30, 1932
	Holdings acquired by purchase			Holdings acquired otherwise than by purchase		Total area acquired in acres	
	Govern- ment funds	Donated funds	Area in acres	How acquired	Area in acres		
1. Acadia National Park.....				Donation.....	300.00	11,559.32	11,859.32
2. Aztec Ruins National Monument.....						25.88	25.88
3. Carlsbad Caverns National Park.....						1.00	1.00
4. Colonial National Monument.....						1,960.52	1,960.52
5. Crater Lake National Park.....						.75	.75
6. General Grant National Park.....				Donation.....	99.08	20.00	20.00
7. George Washington Birthplace National Monument.....						384.62	483.70
8. Glacier National Park.....	\$202,002.85	\$193,272.85	2,516.32	Donation, States of North Caro- lina and Ten- nessee.	138,843.20	1,160.54	3,676.86
9. Great Smoky Mountains National Park.....						153,876.50	297,719.70
10. Hawaii National Park.....						156,800.00	156,800.00
11. Hot Springs National Park.....						16.00	16.00
12. Lassen Volcanic National Park.....						40.00	40.00
13. Mesa Verde National Park.....						350.20	350.20
14. Muir Woods National Monument.....						423.43	426.43
15. Pinnacles National Monument.....						1,926.27	1,926.27
16. Rocky Mountain National Park.....	411,231.00	345,106.00	4,237.17			321.76	4,558.93
17. Sequoia National Park.....						3,294.25	3,294.25
18. Elk Refuge north of Yellowstone National Park.....	12,022.50	12,022.50	934.01			1,441.87	2,375.88
19. Wind Cave National Park.....	9,500.00		100.77			100.77	2,100.77
20. Yosemite National Park.....				Donation.....	640.00	26,822.89	27,462.89
21. Zion National Park.....	45,970.00	21,125.00	679.15			677.21	1,356.36
22. Yucca House National Monument.....						9.60	9.60
Total.....	680,726.35	571,526.35	8,467.42		139,882.28	148,349.70	514,645.31

APPENDIX C

TRAVEL, FISCAL, AND MISCELLANEOUS STATISTICS

NATIONAL PARKS TABLE 7.—Visitors to the national parks, 1917-1932

Name of park	1917	1918	1919	1920	1921	1922	1923	1924
Acadia.....			¹ 64, 000	¹ 66, 500	¹ 69, 836	73, 779	64, 200	71, 758
Crater Lake.....	11, 645	13, 231	16, 645	20, 135	28, 617	33, 016	52, 017	64, 312
General Grant.....	17, 390	15, 496	21, 574	19, 661	30, 312	50, 456	46, 230	35, 020
Glacier.....	18, 387	9, 086	18, 956	22, 449	19, 736	23, 935	33, 988	33, 372
Grand Canyon.....			37, 745	67, 315	67, 485	84, 700	102, 166	108, 256
Hawaii.....	(²)	(²)	(²)	(²)	¹ 16, 071	27, 750	41, 150	52, 110
Hot Springs.....	¹ 135, 000	¹ 140, 000	¹ 160, 490	¹ 162, 850	¹ 130, 968	¹ 106, 164	¹ 112, 000	¹ 164, 175
Lassen Volcanic.....	¹ 8, 500	¹ 2, 000	¹ 2, 500	¹ 2, 000	¹ 10, 000	¹ 10, 000	¹ 9, 500	¹ 12, 500
Mesa Verde.....	2, 223	2, 058	2, 287	2, 890	3, 003	4, 251	5, 236	7, 109
Mount McKinley.....	(²)	(²)	(²)	(²)	(²)	³ 7	³ 34	² 62
Mount Rainier.....	35, 568	43, 901	55, 232	56, 491	55, 771	70, 371	123, 708	161, 473
Platt.....	¹ 35, 000	14, 431	26, 312	27, 023	¹ 60, 000	¹ 70, 000	¹ 117, 710	¹ 134, 874
Rocky Mountain.....	117, 186	101, 497	169, 492	240, 966	¹ 273, 737	¹ 219, 164	218, 000	224, 211
Sequoia.....	18, 510	15, 001	30, 443	31, 508	28, 263	27, 514	30, 158	34, 468
Sullys Hill.....	2, 207	4, 188	4, 026	9, 341	9, 100	¹ 9, 548	8, 478	8, 035
Wind Cave.....	16, 742	¹ 36, 000	¹ 25, 000	¹ 38, 000	28, 336	31, 016	41, 505	52, 166
Yellowstone.....	35, 400	21, 275	62, 261	79, 777	81, 651	98, 223	138, 352	144, 158
Yosemite.....	34, 510	33, 497	58, 362	68, 906	91, 513	100, 506	130, 046	105, 894
Zion.....				3, 692	2, 937	4, 109	6, 408	8, 400
Total.....	488, 268	451, 661	755, 325	919, 504	1, 007, 335	1, 044, 502	1, 280, 886	1, 422, 353

Name of park	1925	1926	1927	1928	1929	1930	1931	1932
Acadia.....	73, 673	101, 256	123, 699	134, 897	149, 554	154, 734	162, 238	237, 596
Bryce Canyon.....					21, 997	35, 982	41, 572	34, 143
Carlsbad Caverns ⁵						90, 104	81, 275	61, 474
Crater Lake.....	65, 018	86, 019	82, 354	113, 323	128, 435	157, 693	170, 264	109, 738
General Grant.....	40, 517	50, 597	47, 996	51, 988	44, 783	43, 547	51, 995	40, 806
Glacier.....	40, 063	37, 525	41, 745	53, 454	70, 742	73, 776	63, 497	53, 202
Grand Canyon.....	134, 053	140, 252	162, 356	167, 226	184, 093	172, 763	156, 964	121, 267
Grand Teton.....					¹ 51, 500	¹ 60, 000		¹ 40, 000
Great Smoky Moun- tains.....							¹ 154, 000	¹ 300, 000
Hawaii.....	64, 155	¹ 35, 000	37, 551	78, 414	109, 857	89, 578	124, 932	139, 663
Hot Springs.....	¹ 265, 500	¹ 260, 000	¹ 181, 523	¹ 199, 099	184, 517	167, 062	153, 394	201, 762
Lassen Volcanic.....	¹ 12, 956	18, 739	20, 089	26, 057	26, 106	31, 755	56, 833	41, 723
Mesa Verde.....	9, 043	11, 356	11, 915	16, 760	14, 517	16, 656	18, 003	15, 760
Mount McKinley.....	⁴ 206	⁴ 533	⁴ 651	⁴ 802	1, 038	951	771	357
Mount Rainier.....	173, 004	161, 796	200, 051	219, 531	217, 783	265, 620	293, 562	216, 065
Platt.....	¹ 143, 380	¹ 124, 284	¹ 294, 954	¹ 280, 638	¹ 204, 598	¹ 178, 188	⁶ 325, 000	200, 471
Rocky Mountain.....	233, 912	¹ 225, 027	¹ 229, 862	¹ 235, 057	¹ 274, 408	255, 874	265, 663	282, 980
Sequoia.....	46, 677	89, 404	100, 684	98, 035	111, 355	129, 221	143, 573	131, 398
Sullys Hill.....	9, 183	19, 921	22, 632	24, 979	21, 004	21, 293	(⁷)	(⁷)
Wind Cave.....	69, 267	85, 466	81, 023	100, 309	108, 943	88, 000	¹ 85, 000	⁸ 12, 539
Yellowstone.....	154, 282	187, 807	200, 825	230, 984	260, 697	227, 901	221, 248	157, 624
Yosemite.....	209, 166	274, 209	490, 430	460, 619	461, 257	458, 566	461, 855	498, 289
Zion.....	16, 817	21, 964	24, 303	30, 016	33, 383	55, 297	59, 186	51, 650
Total.....	1, 760, 872	1, 930, 955	2, 354, 643	2, 522, 188	2, 680, 597	2, 774, 561	3, 152, 845	2, 948, 507

¹ Estimated.

² No record.

³ Actual park visitors; some miners and prospectors also passed through park.

⁴ Indicated loss in travel from 1921 due largely to better methods of checking and estimating employed.

⁵ National park established by act of May 14, 1930. Formerly a national monument.

⁶ Much of this travel, which is estimated, originated in the locality.

⁷ By act of Congress of Mar. 3, 1931, this area was transferred to the Department of Agriculture to be administered as a game preserve.

⁸ Actual admissions to the Cave. Through travel over the park highway is estimated at 100,000 cars carrying 300,000 visitors.

NATIONAL PARKS TABLE 8.—*Detail comparative statistics of travel and campers, 1931-1932*

Name of park	Number of private automobiles			Visitors by private automobiles			Visitors by stage and rail			Visitors by other means		Total visitors		Number of campers	
	1931	1932		1931	1932		1931	1932		1931	1932	1931	1932	1931	1932
Acadia.....	40,393	58,174		155,788	232,696		6,450	34,900				162,238	237,596	(1)	(1)
Bryce Canyon.....	11,714	10,469		39,238	33,118		2,308	991		6	34	41,572	34,143	7,348	6,364
Carlsbad Caverns.....	27,808	19,667		79,580	2 60,000		1,695	1,474		(1)	(1)	81,275	61,474		
Crater Lake:															
North entrance.....	1,362	625		4,133	1,999					13	6	4,196	2,005		
West entrance.....	27,713	15,331		83,350	44,939		198	135		120	58	83,668	45,182		
South entrance.....	19,850	14,592		60,106	45,269		337	167		122	70	60,565	45,506		
East entrance.....	7,264	5,917		21,855	17,027						18	21,855	17,045		
Total.....	56,189	36,465		169,494	109,284		535	302		255	152	170,284	109,738	16,647	11,524
General Grant.....	16,245	12,773		51,995	40,806							51,995	40,806	4,412	2,597
Glacier.....	16,415	14,150		53,314	46,706		6,046	3,268		4,137	3,228	63,497	53,202	13,848	12,944
Grand Canyon:															
South rim entrance.....	34,147	28,455		102,109	84,793		35,150	21,521				106,314	50,317	54,261	50,317
North rim entrance.....	5,697	4,648		17,677	14,132		2,028	821				14,953			
Total.....	39,844	33,103		119,786	98,925		37,178	4 22,342				156,964	121,267	54,261	50,317
Grand Teton.....	2 16,170	11,432		2 61,108	39,664		368	161		434	175	2 62,000	2 40,000	13,279	9,335
Great Smoky Mountains.....	2 51,000	2 85,000		2 134,000	2 300,000		(1)	(1)		(1)	(1)	2 154,000	2 300,000	(1)	(1)
Hawaii.....	31,026	32,204		124,932	139,663		70,999	94,306				124,932	139,663	(1)	(1)
Hot springs.....	13,394	33,651		82,395	107,456							153,394	201,762	3,730	4,491
Lassen Volcanic:															
Warner Valley entrance.....	2,401	2,182		7,228	6,713		(1)	(1)				7,228	6,713		
Juniper Lake entrance.....	931	493		2,866	1,513		(1)	(1)				2,866	1,513		
Sulphur Works entrance.....	9,787	6,455		31,447	21,772		(1)	(1)		3	22	31,450	21,794		
Manzanita Lake entrance.....	3,622	3,222		10,996	10,076		(1)	(1)		3		10,999	10,079		
Lost Creek entrance.....	780	34		2,357	1,114		(1)	(1)				2,357	1,114		
Butte Lake entrance.....	752	524		1,933	1,510		(1)	(1)				1,933	1,510		
Total.....	18,273	12,910		56,827	41,698					6	25	56,833	41,723	8,099	11,065
Mesa Verde.....	5,334	4,914		17,654	15,639		121	52		228	69	18,003	15,760	10,620	8,637
Mount McKinley.....							771	357				771	357		

NATIONAL PARKS TABLE 9.—*Visitors to the national monuments, 1927-1932*¹

Name	1927	1928	1929	1930	1931	1932
Arches (Utah).....			² 500	² 400	² 405	² 480
Aztec Ruins (New Mexico).....	7,298	18,359	18,193	12,906	10,710	8,322
Bandelier (New Mexico).....						4,164
Canyon de Chelly (Arizona).....					423	395
Capulin Mountain (New Mexico).....	12,617	² 7,600	² 12,000	² 16,500	² 18,000	² 25,000
Carlsbad Cave (New Mexico).....	26,436	46,335	76,822	(³)	(³)	(³)
Casa Grande (Arizona).....	28,818	28,274	37,244	36,656	27,675	21,895
Chaco Canyon (New Mexico).....	² 1,500	1,425	² 2,750	² 2,300	1,780	2,725
Colonial (Virginia).....						⁴ 400,000
Colorado (Colorado).....	² 9,500	² 10,000	² 12,000	² 13,000	² 16,000	² 18,000
Craters of the Moon (Idaho).....	5,771	7,768	7,730	7,365	5,885	6,296
Devils Tower (Wyoming).....	² 10,400	² 8,000	² 12,000	14,720	² 11,000	11,585
El Morro (New Mexico).....	5,178	5,356	2,625	² 3,500	3,854	² 2,700
George Washington Birthplace (Virginia).....				² 10,000	² 22,500	65,154
Gran Quivira (New Mexico).....	2,034	2,779	3,357	4,812	4,232	3,844
Great Sand Dunes (Colorado).....						² 500
Hovenweep (Utah-Colorado).....	263	² 240	² 450	² 400	² 440	² 400
Montezuma Castle (Arizona).....	15,400	16,232	17,824	19,298	14,411	² 14,000
Muir Woods (California).....	101,514	103,571	93,358	77,311	73,717	50,746
Natural Bridges (Utah).....	82	175	² 260	² 300	368	344
Navajo (Arizona).....	² 260	315	965	215	² 300	² 300
Papago Saguaro (Arizona).....	60,540	66,450	² 87,600	² 50,000	(⁵)	(⁵)
Petrified Forest (Arizona).....	61,761	75,225	69,350	105,433	93,898	84,228
Pinnacles (California).....	11,265	13,216	10,756	11,862	12,813	14,238
Pipe Spring (Arizona).....	16,853	17,321	24,883	8,765	² 2,300	² 2,100
Rainbow Bridge (Utah).....	² 300	² 200	² 450	325	² 350	² 325
Scotts Bluff (Nebraska).....	² 30,000	² 37,500	² 42,500	² 48,500	² 48,000	² 45,000
Shoshone Cavern (Wyoming).....		² 300				
Sitka (Alaska).....	² 3,000	² 3,000	² 3,500	² 3,000	² 8,000	² 6,500
Tumacacori (Arizona).....	16,761	17,341	18,250	15,603	12,036	13,758
Verendrye (North Dakota).....	² 15,000	² 15,000	² 11,500	² 8,000	² 2,000	² 2,000
Wupatki (Arizona).....	² 450	² 500	² 550	684	² 650	² 850
Yucca House (Colorado).....	196	174	² 250	² 240	264	² 240
Total.....	443,197	502,656	567,667	472,095	392,011	806,089

¹ No records for other national monuments.² Estimated.³ Made a national park by act of Congress approved May 14, 1930.⁴ Includes 225,000 attending Sesquicentennial celebration.⁵ National monument status of Papago Saguaro abolished by act of Congress approved Apr. 7, 1930.NATIONAL PARKS TABLE 10.—*Entries of private automobiles to the national parks during seasons 1925-1932*¹

Name of park	1925	1926	1927	1928	1929	1930	1931	1932
Acadia ²	9,381	15,361	29,181	31,998	35,972	37,118	40,393	58,174
Bryce Canyon.....					5,223	10,007	11,734	10,469
Carlsbad Caverns ³						28,850	27,808	19,667
Crater Lake.....	19,451	26,442	25,667	34,869	39,043	51,020	56,189	36,465
General Grant.....	11,108	12,869	13,172	14,681	12,995	13,924	16,245	12,773
Glacier.....	7,585	6,727	7,980	9,860	14,320	18,318	16,415	14,150
Grand Canyon.....	19,910	22,849	28,479	32,316	37,848	39,572	39,844	33,103
Grand Teton.....					⁴ 16,200	⁴ 20,000	16,170	11,432
Great Smoky Mountains ²							⁴ 51,000	⁴ 85,000
Hawaii ²	12,650	³ 6,500	8,345	14,505	18,347	28,251	31,026	32,204
Hot Springs ²			³ 1,559	³ 1,455	28,290	25,426	13,394	33,551
Lassen Volcanic.....	2,646	5,423	5,899	8,137	8,370	9,896	18,273	12,910
Mesa Verde.....	2,197	3,054	3,315	4,803	4,224	5,023	5,334	4,914
Mount Rainier.....	39,860	38,626	48,275	50,005	51,998	62,866	74,947	54,180
Platt ²	³ 60,000	45,796	⁴ 75,000	⁴ 70,000	⁴ 65,000	⁴ 71,500	⁴ 100,000	40,174
Rocky Mountain ²	³ 58,057	³ 50,407	⁴ 54,109	⁴ 57,381	67,682	73,101	75,429	81,359
Sequoia ⁶	14,273	26,503	30,165	29,290	33,250	39,631	44,701	40,820
Sullys Hill ²	2,271	4,484	⁴ 4,700	5,229	4,936	4,284	(⁷)	(⁷)
Wind Cave ²	22,598	28,332	26,879	33,300	36,317	⁴ 20,000	⁴ 25,000	⁸ 4,500
Yellowstone.....	33,068	⁸ 44,326	49,055	58,186	68,415	63,588	63,795	46,846
Yosemite.....	49,229	74,885	137,296	131,689	132,903	141,267	151,126	161,909
Zion.....	3,928	4,796	6,203	7,632	8,612	15,633	18,215	16,180
Total.....	368,212	417,386	557,079	595,236	689,945	779,275	897,038	810,780

¹ Automobiles and motor cycles entering parks with or without licenses, to and including Sept. 30, 1932.² No license required.³ National park established by act of May 14, 1930. Formerly a national monument.⁴ Estimated.⁵ Count made only at public camp ground.⁶ License required only for Giant Forest Road.⁷ By act of Congress of Mar. 3, 1931, this area was transferred to the Department of Agriculture to be administered as a game preserve.⁸ Estimated. Approximately 100,000 cars went over park highway during 1932 season, but only 4,500 cars (estimated) were used by persons actually entering the cave.

NATIONAL PARKS TABLE 11.—*Automobile and motor-cycle licenses issued during seasons 1928-1932*

Name of park ¹	1928		1929		1930		1931		1932	
	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles	Auto- mobiles	Motor cycles
Crater Lake.....	27,898	46	23,954	46	37,595	10	35,716	51	29,637	-----
General Grant.....	6,380	-----	6,028	-----	7,199	-----	7,397	-----	5,900	-----
Glacier.....	7,350	5	7,577	-----	10,498	7	11,362	-----	10,712	11
Grand Canyon.....	26,429	-----	29,229	-----	33,780	-----	36,797	-----	32,651	-----
Lassen Volcanic ²	-----	-----	-----	-----	-----	-----	-----	-----	4,803	3
Mesa Verde.....	4,256	13	3,926	9	4,599	-----	4,863	-----	4,382	-----
Mount Rainier.....	32,885	33	32,184	61	35,498	28	41,217	16	44,719	-----
Sequoia ³	16,599	-----	16,799	-----	20,998	-----	21,802	-----	18,304	-----
Yellowstone.....	54,139	179	56,150	159	63,853	187	56,401	176	52,597	155
Yosemite.....	75,213	183	74,229	167	81,365	186	76,678	175	67,482	129
Zion.....	6,107	-----	6,822	-----	10,284	-----	15,754	-----	12,967	-----
Total.....	257,256	459	256,898	442	305,669	418	307,987	418	284,154	298

¹ No licenses required for Wind Cave, Hot Springs, Platt, Hawaii, Sullys Hill, Rocky Mountain, Carlsbad Caverns, Mount McKinley, and Acadia National Parks.

² No license required prior to 1932 fiscal year.

³ License required only for Giant Forest Road.

Licenses not required in certain parks because of small road mileage or unimproved condition of roads (see footnote 1). Licenses also not required for travel on unimproved roads in other parks. No charge for license issued for operating cars on official business.

NATIONAL PARKS TABLE 12.—*Receipts collected from automobiles and motor cycles during seasons 1928-1932*

Name of park ¹	1928	1929	1930	1931	1932
Crater Lake.....	\$27,944.00	\$24,000.00	\$37,623.00	\$35,803.00	\$29,687.00
General Grant.....	3,190.00	3,014.00	3,599.50	3,698.50	2,950.00
Glacier.....	7,355.00	7,577.00	10,506.00	11,362.00	11,092.00
Grand Canyon.....	26,429.00	29,300.00	33,988.00	36,950.00	32,764.00
Lassen Volcanic ²	-----	-----	-----	-----	5,778.50
Mesa Verde.....	4,269.00	3,944.00	4,644.00	4,917.00	4,396.00
Mount Rainier.....	32,918.00	32,245.00	35,526.00	41,233.00	44,719.00
Sequoia ³	16,599.00	16,799.00	20,998.00	21,802.00	18,304.00
Yellowstone.....	162,596.00	168,608.00	192,218.00	169,379.00	156,537.00
Yosemite.....	150,609.00	148,613.00	162,784.00	153,531.00	135,831.00
Zion.....	3,053.50	3,431.50	7,521.00	15,400.00	12,976.00
Total.....	434,962.50	437,531.50	509,407.50	494,075.50	455,034.50

¹ No licenses required for Wind Cave, Hot Springs, Platt, Hawaii, Sullys Hill, Rocky Mountain, Carlsbad Caverns, Mount McKinley, and Acadia National Parks.

² No license required prior to 1932 fiscal year.

License required only for Giant Forest Road.

NATIONAL PARKS TABLE 13.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during recent fiscal years ¹*

Name of the national park	Appropriations		Revenue received
	Appropriated	Expended	
Acadia (formerly Lafayette):			
1928.....	\$37,940.00	\$37,376.99	-----
1929.....	39,000.00	-----	-----
1929 (deficiency).....	1,355.00	40,014.00	-----
1930.....	52,600.00	48,701.52	-----
1931.....	59,900.00	56,984.42	-----
1932.....	61,600.00	² 59,892.14	-----
1933.....	59,400.00	-----	-----
Bryce Canyon:			
1930.....	26,100.00	21,580.01	-----
1931.....	13,700.00	13,700.00	-----
1932.....	20,000.00	² 19,257.50	-----
1933.....	14,800.00	-----	-----

See footnotes at end of table.

NATIONAL PARKS TABLE 13.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during recent fiscal years—Continued*

Name of the national park	Appropriations		Revenue received
	Appropriated	Expended	
Carlsbad Caverns National Park:			
1928.....	\$30,000.00	\$28,492.84	\$55,682.00
1929.....	70,000.00	63,490.00	84,983.45
1929 (deficiency).....	260.00		
1930.....	100,000.00	¹ 103,271.01	136,241.78
1931.....	165,600.00	124,220.75	143,779.55
1932.....	150,100.00	² 130,162.62	113,677.43
1933.....	128,800.00		
Crater Lake:			
1928.....	63,590.00	62,382.53	22,927.69
1929.....	47,100.00	³ 61,464.00	24,318.22
1929 (deficiency).....	850.00		
1930.....	59,800.00	67,938.75	38,023.70
1930 (deficiency).....	12,000.00		
1931.....	73,300.00	³ 73,551.96	35,843.15
1932.....	106,900.00	106,753.64	29,687.00
1933.....	90,000.00		
General Grant:			
1928.....	13,650.00	13,529.26	3,488.90
1929.....	15,650.00	15,802.00	3,305.70
1929 (deficiency).....	500.00		
1930.....	15,650.00	15,448.14	3,868.28
1931.....	15,860.00	15,841.07	3,989.95
1932.....	21,900.00	21,881.86	3,973.22
1933.....	21,900.00		
Glacier:			
1928.....	163,300.00	162,525.28	14,652.59
1929.....	188,200.00	191,061.00	18,436.18
1929 (deficiency).....	5,065.00		
1930.....	219,400.00	215,726.91	22,146.16
1931.....	227,000.00	223,956.32	17,866.46
1931 (deficiency).....	9,550.00		
1932.....	256,500.00	² 246,002.11	17,495.56
1933.....	226,200.00		
Great Smoky Mountains:			
1930-31 (deficiency).....	30,000.00	25,193.31	76.00
1932.....	30,000.00	² 29,682.77	5,220.55
1933.....	30,000.00		
Grand Canyon:			
1928.....	128,760.00	128,268.33	46,097.43
1929.....	169,000.00	151,813.00	49,078.33
1929 (deficiency).....	3,540.00		
1930.....	145,000.00	141,389.56	55,684.46
1931.....	153,600.00	³ 171,670.11	51,497.05
1932.....	172,200.00	² 168,106.43	40,221.18
1933.....	150,000.00		
Grand Teton:			
1929.....			25.00
1930.....			70.00
1931.....	30,700.00	29,048.47	20.00
1932.....	76,750.00	² 73,180.80	73.80
1933.....	29,900.00		
Hawaii:			
1928.....	18,250.00	18,119.10	1,450.00
1929.....	21,500.00	21,070.00	1,477.00
1929 (deficiency).....	785.00		
1930.....	27,400.00	25,700.05	1,532.52
1931.....	35,800.00	35,439.55	1,500.00
1932.....	54,600.00	54,594.06	1,493.41
1933.....	51,100.00		
Hot Springs:			
1928.....	69,800.00	67,443.19	47,695.50
1929.....	68,000.00	71,970.00	47,930.90
1929 (deficiency).....	6,320.00		
1930.....	70,900.00	69,173.38	47,931.33
1931.....	218,500.00	194,760.18	50,467.80
1932.....	89,300.00	² 86,110.72	43,243.22
1933.....	87,700.00		
Lassen Volcanic:			
1928.....	15,625.00	15,448.52	167.84
1929.....	22,400.00	22,688.00	34.36
1929 (deficiency).....	460.00		
1930.....	25,300.00	25,061.16	3,089.55
1931.....	30,500.00	29,007.20	51.59
1932.....	50,300.00	² 49,774.20	5,778.50
1933.....	45,100.00		

See footnotes at end of table.

NATIONAL PARKS TABLE 13.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during recent fiscal years—Continued*

Name of the national park	Appropriations		Revenue received
	Appropriated	Expended	
Mesa Verde:			
1928.....	\$50,750.00	\$48,343.59	\$3,342.80
1929.....	83,000.00	} 3 78,134.00	4,719.00
1929 (deficiency).....	1,115.00		
1930.....	57,000.00	53,910.66	4,870.62
1931.....	96,800.00	4 95,799.70	5,411.27
1932.....	57,300.00	} 2 55,724.49	5,011.75
1932 (deficiency).....	22,000.00		
1933.....	72,900.00		
Mount Rainier:			
1928.....	108,000.00	105,447.74	32,495.50
1929.....	141,000.00	} 3 141,285.00	39,233.17
1929 (deficiency).....	3,370.00		
1929-30 (deficiency).....	2,500.00	} 125,214.00	41,530.31
1930.....	122,600.00		
1931.....	180,900.00	174,823.33	46,034.89
1932.....	195,000.00	} 2 263,233.48	48,793.27
1931-32 (deficiency).....	71,000.00		
1933.....	227,100.00		
Mount McKinley:			
1928.....	22,000.00	21,314.12	63.04
1929.....	35,900.00	} 3 36,165.00	1.00
1929 (deficiency).....	740.00		
1930.....	40,000.00	37,680.26	213.18
1931.....	46,700.00	42,686.45	292.00
1932.....	31,100.00	28,157.21	129.66
1933.....	35,600.00		
Platt:			
1928.....	13,050.00	12,991.87	77.16
1929.....	18,000.00	} 19,053.00	33.05
1929 (deficiency).....	1,080.00		
1930.....	16,200.00	16,178.70	
1931.....	18,500.00	18,269.14	
1932.....	35,900.00	} 2 35,506.83	
1933.....	31,600.00		
Rocky Mountain:			
1928.....	97,620.00	95,612.07	924.12
1929.....	95,500.00	} 3 95,230.00	1,537.07
1929 (deficiency).....	2,380.00		
1930.....	96,000.00	94,871.34	4,471.24
1931.....	105,950.00	104,880.57	448.45
1932.....	118,800.00	} 2 117,909.55	749.58
1933.....	114,300.00		
Sequoia:			
1928.....	109,000.00	108,863.10	35,105.83
1929.....	113,000.00	} 3 114,626.00	30,753.00
1929 (deficiency).....	3,440.00		
1930.....	130,000.00	130,056.49	33,934.54
1931.....	113,100.00	111,513.95	35,694.49
1932.....	156,900.00	156,713.93	33,010.38
1933.....	131,800.00		
Wind Cave:			
1928.....	10,850.00	11,500.00	12,725.50
1929.....	11,000.00	} 11,744.00	13,178.17
1929 (deficiency).....	760.00		
1930.....	13,500.00	13,442.51	16,715.01
1931.....	54,900.00	46,271.94	11,968.43
1932.....	25,200.00	} 2 68,074.68	7,258.68
1931-32 (deficiency).....	50,000.00		
1933.....	20,600.00		
Yellowstone:			
1928.....	400,000.00	3 399,150.00	251,663.11
1929.....	434,000.00	} 3 443,230.00	289,388.95
1929 (deficiency).....	12,230.00		
1930.....	453,000.00	} 463,306.47	317,238.17
1930 (deficiency).....	17,000.00		
1931.....	501,275.00	500,026.39	259,723.33
1932.....	560,800.00	} 2 536,739.83	228,644.39
1933.....	530,800.00		
Yosemite:			
1928.....	301,000.00	} 4 257,363.73	276,438.29
1928 (deficiency).....	15,000.00		
1929.....	387,250.00	} 3 449,159.00	237,166.90
1929 (deficiency).....	14,385.00		
1930.....	412,360.00	} 4 390,204.38	280,385.45
1930 (deficiency).....	5,381.00		

See footnotes at end of table.

NATIONAL PARKS TABLE 13.—*Statement of appropriations made for and revenues received from, the various national parks and national monuments, and expenditures made therefrom during recent fiscal years.*—Continued

Name of the national park	Appropriations		Revenue received
	Appropriated	Expended	
Yosemite—Continued			
1931	\$510, 100. 00	} \$574, 302. 64	\$260, 805. 28
1931 (deficiency)	32, 500. 00		
1932	558, 600. 00		
1933	401, 200. 00		
Zion:			
1928	30, 900. 00	} 30, 737. 69	3, 106. 50
1929	38, 000. 00		
1929 (deficiency)	3, 295. 00		
1930	38, 300. 00		
1931	33, 200. 00	} 42, 290. 11	7, 724. 01
1932	54, 100. 00		
1933	46, 600. 00		
George Washington B. P. Natl., Mon.:			
1930 (deficiency)	996. 18	} 987. 71	
1930-31 (deficiency)	80, 000. 00		
1931	2, 500. 00		
1932	26, 500. 00		
1933	25, 800. 00	} 26, 050. 83	1. 00
Colonial National Monument:			
1931-32 (deficiency)	135, 000. 00	} 132, 648. 99	299. 95
1933	72, 000. 00		
Protection of National Monuments:			
1928	25, 000. 00	} 24, 042. 56	132. 00
1929	35, 000. 00		
1929 (deficiency)	1, 225. 00		
1930	46, 000. 00		
1931	83, 900. 00	} 42, 634. 76	100. 00
1931 (deficiency)	3, 000. 00		
1932	165, 400. 00		
1933	93, 800. 00		
National Park Service:			
1928	57, 100. 00	} 57, 047. 56	20. 10
1929	70, 200. 00		
1929 (deficiency)	4, 660. 00		
1930	80, 830. 00		
1931	117, 000. 00	} 81, 864. 36	0. 25
1932	167, 400. 00		
1933	174, 620. 00		
Fighting forest fires:			
1922	25, 000. 00	} 9, 618. 30	
1923	25, 000. 00		
1924	25, 000. 00		
1925	20, 000. 00		
General expenses, N. P. S.:			
1931	25, 000. 00	} 24, 993. 02	
1932	35, 100. 00		
1933	37, 000. 00		
Emergency reconstruction: 1925	20, 000. 00		
Forest protection and fire prevention:			
1931	96, 850. 00	} 95, 856. 95	
1932	170, 000. 00		
1933	140, 000. 00		
Emergency reconstruction and fighting forest fires:			
1926	40, 000. 00	} 80, 000. 00	
1926 (deficiency)	40, 000. 00		
1927	40, 000. 00		
1927 (deficiency)	235, 000. 00		
1928	40, 000. 00	} 228, 647. 83	
1929 (deficiency)	29, 000. 00		
1930	20, 000. 00		
1930 (deficiency)	180, 000. 00		
1931	50, 000. 00	} 180, 300. 17	
1932	50, 000. 00		
1932 (deficiency)	55, 000. 00		
1933	50, 000. 00		
Construction of roads and trails:			
1925 (deficiency)	1, 000, 000. 00	} 1, 000, 000. 00	
1926	1, 500, 000. 00		
1927	2, 000, 000. 00		
1928	2, 000, 000. 00		
1928 (deficiency)	1, 000, 000. 00	} 1, 000, 000. 00	
1929	2, 500, 000. 00		
1930	5, 000, 000. 00		
1931	5, 000, 000. 00		
1931 (deficiency)	2, 500, 000. 00	} 7, 500, 000. 00	
1932	5, 000, 000. 00		
1933	4, 500, 000. 00		

See footnotes at end of table.

NATIONAL PARKS TABLE 13.—*Statement of appropriations made for, and revenues received from, the various national parks and national monuments, and expenditures made therefrom during recent fiscal years—Continued*

Name of the national park	Appropriations		Revenue received
	Appropriated	Expended	
Emergency construction, roads and trails:			
1931 (deficiency).....	2, 078, 800. 00	2, 078, 800. 00	-----
1933.....	3, 500, 000. 00	-----	-----
Insect control:			
1925-26 (deficiency).....	25, 000. 00	24, 945. 24	-----
1927.....	20, 000. 00	19, 828. 96	-----
1928.....	7, 500. 00	7, 379. 35	-----
Southern Appalachian:			
1925-26 (deficiency).....	20, 000. 00	12, 453. 27	-----
1927.....	(⁴)	7, 252. 21	-----
1928.....	5, 000. 00	4, 887. 13	-----
1929.....	4, 500. 00	4, 945. 07	-----
1930.....	3, 000. 00	4, 415. 75	-----
1931.....	3, 000. 00	4, 172. 45	-----
Purchase of lands:			
1928.....	50, 000. 00	13, 925. 00	-----
1929.....	50, 000. 00	1, 383. 00	-----
1930.....	250, 000. 00	17, 233. 93	-----
1931.....	1, 750, 000. 00	\$ 1, 983, 718. 06	-----
1932.....	1, 000, 000. 00	4, 711, 688. 33	-----
Extension of winter-feed facilities:			
1930.....	75, 000. 00	7, 612. 50	-----
1931.....	75, 000. 00	10, 265. 00	-----
1932.....	-----	\$ 12, 022. 50	-----
Purchase of lands Colonial National Monument:			
1931-32 (deficiency).....	500, 000. 00	500, 000. 00	-----

¹ For statement of appropriations and revenues prior to 1917 see 1920 Annual Report, pp. 354-358, and for 1918-1927 see 1930 Annual Report, pp. 66-72.

² Appropriation decreased by transfers to emergency reconstruction and fighting forest fires under authority contained in the appropriation act. (See Table 18.)

³ Appropriation augmented by transfers from other appropriations under 10 per cent clause.

⁴ Reappropriated items. (See Table 14.)

⁵ Available until expended.

NATIONAL PARKS TABLE 14.—*Statement of amounts reappropriated and made available for expenditure in subsequent fiscal years*

Appropriated for fiscal year	Reappropriated for fiscal year	Park	Amount	Purpose
1928.....	1929	Yosemite.....	\$35, 000. 00	Hospital building.
1928.....	1929	Southern Appalachian.....	1, 112. 87	To remain available; general.
1928.....	1929	Emergency reconstruction and fighting forest fires.....	13, 134. 54	Do.
1929.....	1930	Yosemite.....	8, 661. 78	Construction of water supply and campground facilities.
1929.....	1930	Carlsbad Caverns.....	4, 950. 00	Superintendent's residence.
1929.....	1930	Southern Appalachian.....	1, 662. 55	To remain available; general.
1929.....	1931	Grand Canyon.....	20, 000. 00	Hospital building.
1930.....	1931	Acadia.....	2, 850. 00	Equipment storage building.
1930.....	1931	Crater Lake.....	1, 091. 06	Ranger station.
1930.....	1931	Mesa Verde.....	1, 652. 18	2 ranger stations.
1930.....	1931	Yosemite.....	32, 662. 70	Physical improvements.
1930.....	1931	National monuments.....	2, 500. 00	Employees' quarters (2) at Petrified Forest.
1930.....	1931	Southern Appalachian.....	1, 246. 80	To remain available; general.
1930.....	1931	Glacier.....	9, 550. 00	One-third of cost of constructing a telephone line.
1931.....	1932	National monuments.....	1, 759. 23	Water supply system at Craters of the Moon.
1931.....	1932	Emergency reconstruction and fighting forest fires.....	7, 434. 15	To remain available; general.

NATIONAL PARKS TABLE 15.—*Statement of amounts transferred under the authority contained in the appropriation acts to transfer 10 per cent from one appropriation to another, fiscal year 1932*

Year	Amount	From—	To—
1932..	\$380	Grand Canyon National Park.	Forest protection and fire prevention.

NATIONAL PARKS TABLE 16.—*Summary of appropriations for the administration, protection, and improvement of the national parks and national monuments, together with the revenues received, for the fiscal years 1917¹–1932, inclusive*

Year	Department	Appropriation		Revenues
1917	Interior Department.....	\$537,366.67	\$784,566.67	\$180,652.30
	War Department.....	247,200.00		
1918	Interior Department.....	530,680.00	748,180.00	2 217,330.55
	War Department.....	217,500.00		
1919	Interior Department.....	963,105.00	1,013,105.00	196,678.03
	War Department.....	50,000.00		
1920		907,070.76		316,877.96
1921		1,058,969.16		396,928.27
1922		1,433,220.00		432,964.89
1923		1,446,520.00		513,706.36
1924		1,892,601.00		663,886.32
1925		3,027,657.00		670,920.98
1926		3,258,409.00		826,454.17
1927		3,698,920.00		703,849.60
1928		4,889,655.00		808,255.81
1929		4,754,015.00		849,272.95
1930		7,813,817.18		1,015,740.56
1931		12,113,435.00		940,364.79
1932		12,831,250.00		820,654.19
1933		10,640,620.00		

¹ For summary of appropriations and revenues prior to 1917 see 1920 Annual Report, p. 359.² The revenues from the various national parks were expendable during the years 1904 to 1918, inclusive, with the exception of those received from Crater Lake, Mesa Verde, and Rocky Mountain National Parks, the revenues from which were turned into the Treasury to the credit of miscellaneous receipts.NATIONAL PARKS TABLE 17.—*Statement of amounts transferred to Emergency Reconstruction and Fighting Forest Fires under authority contained in the appropriation act, fiscal year 1932*

Transferred from	Year	Amount
Acadia National Park.....	1932	\$600.00
Bryce Canyon National Park.....	1932	200.00
Carlsbad Caverns National Park.....	1932	1,500.00
Glacier National Park.....	1932	7,565.00
Grand Canyon National Park.....	1932	1,720.00
Grant Teton National Park.....	1932	270.00
Great Smoky Mountains National Park.....	1932	300.00
Hot Springs National Park.....	1932	900.00
Lassen Volcanic National Park.....	1932	500.00
Mesa Verde National Park.....	1932	570.00
Mount Rainier National Park.....	1932	1,950.00
Platt National Park.....	1932	360.00
Rocky Mountain National Park.....	1932	1,200.00
Wind Cave National Park.....	1932	6,950.00
Yellowstone National Park.....	1932	20,600.00
Yosemite National Park.....	1932	20,965.20
Zion National Park.....	1932	540.00
George Washington Birthplace National Monument.....	1932	265.00
Colonial National Monument.....	1932	825.00
Protection of National Monuments.....	1932	6,639.00
Total.....		74,419.20

NATIONAL PARKS TABLE 18.—*Statement of appropriations and authorizations for road and trail work in the national parks and national monuments*

Appropriation acts	Fiscal year	Cash appropriation	Authority to enter into contractual obligations	Total program by fiscal years
Act Dec. 5, 1924; 43 Stat. 686.....	1925	¹ \$1,000,000		\$1,000,000
Act Mar. 3, 1925; 43 Stat. 1179.....	1926	1,500,000	² \$1,000,000	2,500,000
Act May 10, 1926; 44 Stat. 491.....	1927	2,000,000	² 1,500,000	2,500,000
Act Jan. 12, 1927; 44 Stat. 966.....	1928	2,000,000	² 2,500,000	
First Efficiency act, Dec. 22, 1927; 45 Stat. 19.....		1,000,000		3,000,000
Act Mar. 7, 1928; 45 Stat. 237.....	1929	2,500,000	² 4,000,000	5,000,000
Act Mar. 4, 1929; 45 Stat. 1601.....	1930	5,000,000	² 2,500,000	3,500,000
Act May 14, 1930; 46 Stat. 319.....		5,000,000		
Act Dec. 20, 1930; emergency construction.....	1931	1,500,000	² 2,500,000	7,078,800
Emergency construction funds transferred by the President.....		578,800		
Act Feb. 14, 1931; 46 Stat. 1115.....	1932	5,000,000	² 2,850,000	
Second deficiency act 1931; Mar. 4, 1931.....		2,500,000		7,850,000
Act Apr. 22, 1932 stat.....	1933	4,500,000	³ 2,500,000	7,150,000
Emergency construction and relief.....		3,000,000		
Total appropriated.....		37,078,800		
Authorization (unappropriated).....			2,500,000	
Total program to date.....				39,578,800

¹ Of this amount \$4,290.39 was reappropriated Dec. 22, 1927 (45 Stat. 46) and \$510 on May 29, 1928 (45 Stat. 933).² Funds appropriated in next year.³ Funds will be appropriated in 1934.

NATIONAL PARKS TABLE 19.—Summary of educational activities in the national parks October 1, 1931, to September 30, 1932 *

	Guided trips						Lectures						Contacts				Broadcasts	Lectures outside						
	Auto caravan		Hiking		Boat		Air-plane		Campfire		Lodge Hotel		Museum		Total in park				Total contacts	Total visitors	Per cent contacted	Number	Station	Number
	Number	Cars	Attendance	Number	Attendance	Number	Attendance	Number	Attendance	Number	Attendance	Number	Attendance	Number	Attendance									
PARKS																								
Acadia	3	23	91	64	1,378	9	98										47,936	237,896	20.1					
Bryce Canyon				186	4,420												19,537	34,143	57.2					
Carlsbad				13	417												7,910	61,474	12.8					
Crater Lake	82	365	1,276	38	461	781	185		62	5,811	63	3,533	281	4,632			49,206	109,738	44.8	22	Nedford	2	130	
General Grant				42	1,235												23,547	40,806	57.7					
Glacier	59	276	926	738	7,706	1321	828		360	15,011	148	4,645					31,924	53,202	60.0					
Grand Canyon	207	3,155	10,420	216	4,010				80	417							106,611	121,337	87.9					
Grand Teton									67	3,180							13,576	40,000	33.9					
Hawaii	28	100	526	84	1,218				22	613	6	222	202	9,202			21,786	139,663	15.6	1	KGU	2	940	
Lassen	5	63	319	24	1,911				39	1,812				5,574			24,624	41,723	59.0					
Mesa Verde	824	5,243	17,987	11	38								111	5,890			37,758	15,160	239.6					
Mount Rainier	2	8	141	247	3,170				236	24,753							173,664	216,665	80.3	7	KVI	5	1,475	
Rocky Mountain				63	1,439												19,115	282,980	6.7					
Sequoia	70	882	2,632	118	3,684				480	82,765							112,299	131,398	88.4					
Yellowstone	395	6,033	24,657	1,955	55,681				1,228	189,417							465,049	157,624	295.0					
Yosemite	219	4,902	15,377	597	21,045				1,397	214,885	172	38,405	983	60,904			669,445	498,289	134.3					
Zion	1	3	21	248	5,524				235	8,899	112	4,617	26	572			32,053	51,650	62.0					
Total	1,805	21,653	74,396	4,644	113,308	219	3,111	80	417	375,522	680	4,442	2,033	102,928	7,874	761	2,236,178	83.0		30				
MONUMENTS ¹																								
Petrified Forest																								
Casa Grande																	75,000	84,228	89.0					
Colonial																	21,090	21,895	96.3					
George Washington birth-place																	400,000							
Total																	65,154	2,807,455						

* These tables include only parks and monuments with established ranger-naturalist or ranger-historian service.

¹ Estimated.

Total number of contacts on all caravans, 74,396; total number of contacts on all field trips, 116,836; total number of contacts at all lectures, 558,552; total number of contacts at all museums, 880,075; grand total, 1,629,859.

NATIONAL PARKS TABLE 20.—*Forest fire statistics, calendar year 1931*

Park	Classification of fires				Location of origin of fires				Area burned inside parks to nearest whole acre			
	A ¼ acre or less	B Between ¼ and 10 acres	C 10 acres or over	Total All classes A, B, and C	Inside parks		Outside parks		Timber Acres	Brush Acres	Grass Acres	Total Acres
					Number	On Gov- ernment lands	Number	On pri- vate lands					Entered park	Confined to outside areas
Acadia.....	Number	Number	Number	Number	Number	Number	Number	Number	Acres	Acres	Acres	Acres
Bryce Canyon.....	1			0	1							
Carlsbad Caverns.....				1								
Crater Lake.....	10	1		11								
General Grant.....				1								
Glacier.....	32	10	4	46	29	2		14	127	60	2	189
Grand Canyon.....	7	2	1	10	10				161		1	162
Grand Teton.....	2	1		5	3			2				1
Great Smoky Mountains.....	2	23	39	64	25	20	5	14	2,622	245	23	2,890
Hawaii.....	1		1	2	2							
Hot Springs.....		7		7	6		1		11	2	32	34
Lassen Volcanic.....	2	1	1	4	3							13
Mesa Verde.....	2			2	2				1			1
Mount McKinley.....				0								
Mount Rainier.....	2			2	2							
Platt.....	3			3	3							
Rocky Mountain.....	15			15	9							
Sequoia.....	14	1	3	18	16	1		5	72	153	100	325
Wind Cave.....		1		1				2	8			8
Yellowstone.....	84	7	7	98	95		1	2	19,177		1,187	20,364
Yosemite.....	14	5	2	21	20		1		1,054			1,055
Zion.....	1	2	2	3	2			1	29	21		50
Muir Woods.....	1			1	1			3				
Pinnacles Monument.....				1				1	50	2,390		2,440
Devils Tower Monument.....		1		1	1				1		1	2
Total.....	193	63	64	320	243	23	10	44	23,313	2,877	1,346	27,536

Park	Timber destroyed inside parks			Costs of fire suppression (to nearest whole dollar)						
	Govern- ment	Private	Total	Personal services	Supplies, transporta- tion, etc.	Equip- ment	Indirect costs pro- rated	Total	Salaries of park em- ployees	Grand total
Bryce Canyon	1,000 board feet	1,000 board feet	1,000 board feet	\$57			\$24			\$4
Crater Lake				7				\$81		61
General Grant								7		13
Glacier	90		90	16,161	\$13,774	\$3,165	3,117	36,217	424	36,641
Grand Canyon	52		52	200	58		29	287	40	327
Grand Teton				118	41			139	53	212
Great Smoky Mountains	22	18	40	1,019	17			1,036	167	1,203
Hawaii				14	3			17	5	22
Hot Springs										129
Lassen Volcanic				175				175	118	293
Mount Ranier										5
Rocky Mountain	2		2		13				66	79
Sesquia	68		68	765	206	12	112	1,095	257	1,352
Wind Cave									20	20
Yellowstone	150,539		150,539	57,536	37,320	19,936	7,950	122,742	5,237	127,979
Yosemite	705		705	4,748	1,241	518	505	7,010	558	7,568
Zion	17		17	25		5	15	45	78	123
Muir Woods				2				4	8	12
Pinnacles Monument				480	214			700		700
Devils Tower Monument				31				31	10	41
Total	151,495	18	151,513	81,342	52,889	23,636	11,752	169,619	7,236	176,855

NATIONAL PARKS TABLE 20.—*Forest fire statistics, calendar year 1931*—Continued

Park	Causes of fires										Grand total
	Lightning	Camp fires	Smokers	Débris burnings	Incendiary	Lumbering	Railroads	Miscellaneous	Total men caused	Number	
Acadia.....	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	0
Bryce Canyon.....	-----	1	-----	-----	-----	-----	-----	-----	1	-----	1
Carlsbad Caverns.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0
Crater Lake.....	3	2	4	2	-----	-----	-----	-----	8	-----	11
General Grant.....	-----	-----	-----	1	-----	-----	-----	-----	1	-----	1
Glacier.....	12	8	5	7	1 11	-----	-----	3	34	-----	46
Grand Canyon.....	9	1	-----	-----	-----	-----	-----	-----	1	-----	10
Grand Teton.....	-----	1	-----	-----	-----	-----	-----	-----	5	-----	5
Great Smoky Mountains.....	1	8	16	8	2 31	-----	-----	-----	63	-----	64
Hawaii.....	-----	-----	1	-----	-----	-----	-----	1	2	-----	2
Hot Springs.....	-----	-----	7	-----	-----	-----	-----	-----	7	-----	7
Lassen Volcanic.....	-----	-----	-----	-----	3 1	-----	-----	-----	4	-----	4
Mesa Verde.....	2	1	1	-----	-----	-----	-----	-----	-----	-----	2
Mount McKinley.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2
Mount Rainier.....	1	-----	1	-----	-----	-----	-----	-----	1	-----	0
Platt.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	2
Rocky Mountain.....	4	5	5	-----	-----	-----	-----	2	3	-----	3
Sequoia.....	8	4	2	2	-----	-----	-----	-----	11	-----	15
Wind Cave.....	1	-----	-----	-----	-----	-----	-----	-----	10	-----	15
Yellowstone.....	11	24	23	34	1	-----	-----	-----	87	-----	98
Yosemite.....	7	1	11	1	4 1	-----	-----	5	14	-----	21
Zion.....	1	-----	1	-----	-----	-----	-----	-----	2	-----	3
Muir Woods.....	-----	1	3	-----	-----	-----	-----	-----	4	-----	4
Pinnacles Monument.....	-----	-----	-----	1	-----	-----	-----	-----	1	-----	1
Devils Tower Monument.....	1	-----	-----	-----	-----	-----	-----	-----	-----	-----	1
Total.....	61	58	85	56	45	0	0	15	259	-----	320

Park	Classification of fires according to cost of suppression (includes only those fires which burned inside park boundaries)										Total
	\$25 and under	\$26 to \$50	\$51 to \$100	\$101 to \$200	\$201 to \$500	\$501 to \$1,000	\$1,001 to \$2,000	\$2,001 to \$5,000	Over \$5,000	Number	
Acadia.....	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	0
Bryce Canyon.....	1										1
Carlsbad Caverns.....											1
Crater Lake.....	9	1									0
General Grant.....	14	3	8	1	4			1			11
Glacier.....	7	2	2	1							1
Grand Canyon.....	2										32
Grand Teton.....	39	8	3	1							10
Great Smoky Mountains.....	2										3
Hawaii.....	2										50
Hot Springs.....	7										2
Lassen Volcanic.....	2	1									7
Mesa Verde.....	2										3
Mount McKinley.....											2
Mount Rainier.....	2										0
Platte.....	3										2
Rocky Mountain.....	10										3
Sequoia.....	12			1	2	1					10
Wind Cave.....	1										16
Yellowstone.....	79	3	3	1	3	1					1
Yosemite.....	15	3	1			1		4	2		96
Zion.....	1								1		21
Muir Woods.....	1										2
Pinnacles Monument.....						1					1
Devils Tower Monument.....		1									1
Total.....	210	20	20	6	7	4	0	5	4		276

¹ 7 started inside park; 4 outside.

² 21 started inside park; 10 outside.

³ Outside; did not enter park.

⁴ Started outside and entered park.

NOTE.—Figures on timber destroyed are estimates and not actual cruises.

NATIONAL PARKS TABLE 21.—*Big game animals in various national parks, estimated on the basis of censuses made in 1932*

	Elk	Caribou	Moose	Deer			Antelope	Mountain sheep	Mountain goats	Bear	
				Mule	White tailed	Black tailed				Grizzly	Black
Acadia.....					150						
Bryce Canyon.....				200							
Crater Lake.....	19			60		250	2	360	870	110	40
Glacier.....	1,010		148	1,100	1,900			200			290
Grand Canyon.....				1,200							
Grand Teton.....	50		100	150				60		10	25
Great Smoky Mountains.....					16						
Lassen.....				750							50
Mesa Verde.....				400		4,000					50
Mount McKinley.....	75	15,000									5
Mount Rainier.....	60							3,000		40	5
Platt.....	11				6	550			350		210
Rocky Mountain.....	335										
Sequoia.....				2,625				380			20
Wind Cave ¹				3,500							225
Yellowstone ²	50				12		50				
Yosemite.....	13,800		700	885			668	150		210	520
Zion.....	10			450				25			450
	15,420	15,000	948	29,320	2,084	4,800	744	4,175	1,220	370	1,890

¹ Buffalo, 200.² Buffalo, 1,190.

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